Use of E-learning
in the Developing of the Key Competences

Katowice – Cieszyn 2011

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University of Silesia in Katowice,
Faculty of Ethnology and Sciences
of Education in Cieszyn

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Monograph

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Katowice - Cieszyn 2011

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INTRODUCTION

Heraclitus of Ephesus, in the V century BC, said: "You cannot step twice into the same stream". This saying continues to be relevant up until the present day. New times and knowledge society that is coming into existence requires its citizens to acquire new skills which differ from those which were important in the past. According to Hegel, the essence of reality and truth is contradiction. It is synonymous with the concept of change, becoming, the eternal memory of an infinite task. Proposition, negation, synthesis - this is real life of reality and truth. Thus the spirit grows, and so does the individual, so does Nature. Reality and truth are a constantly occurring synthesis of eternal contradictions. The contradiction between new challenges and requirements of the knowledge society, and the insufficient competence level possessed by contemporary workers and people in general make it necessary to formulate new criteria and standards applicable to citizens of the knowledge society (www.wikipedia.org). Dialectical processes of development of reality and of our cognition, the laws of dialectics: law of the transition from quantity into quality and conversely, the law of the unity of opposites, law of the negation of the negation, quite confirm and justify the need for such changes.

In the well-known document, adopted in 2006 by the European Parliament (Recommendation 2006/962/EC of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning [Official Journal L 394 of 30.12.2006])) eight key competences are defined that are needed by every person for self-realization and personal development, for being an active citizen and for achieving full social integration and employment. Competences are defined as a combination of knowledge, skills and attitudes appropriate to the situation. Because they should be acquired by everyone, this recommendation proposes a reference tool for European Union (EU) countries to ensure that these key competences are fully integrated into their strategies and infrastructures, particularly in the context of lifelong learning. They provide added value for the labour market, social cohesion and active citizenship by offering flexibility and adaptability, satisfaction and motivation. The following key competencies have been established:

1) Communication in the mother tongue;

2) Communication in foreign languages;

3) Mathematical competence and basic competences in science and technology;

4) Digital competence;

5) Learning to learn;

6) Social and civic competences;

7) Sense of initiative and entrepreneurship; and

8) Cultural awareness and expression. (Recommendation 2006/962/EC of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning [Official Journal L 394 of 30.12.2006]))

The acquisition of key competences fits in with the principles of equality and access for all. This reference framework also applies in particular to disadvantaged groups whose educational potential requires support. The transversal nature of key competences makes them essential. They provide added value for employment, social cohesion or young people (European Youth Pact), which explains the importance of lifelong learning in terms of adapting to change and integration.

At the same time e-learning, which today is no longer considered as a fashionable modern trend, but as an effective, modern form, method, technology of teaching and learning proves its utility not only in tertiary education but also at lower levels of education – in secondary and basic schools.

Simultaneously there are still a lot of questions that have not been answered yet. The papers of the authors included in the monograph try to do it. Among the aspects and problems raised in the materials of monograph one can enumerate the following issues:

- Key competencies and distance learning and their place in Czech, Poland and Slovak government and educational documents;
- Distance learning, key competencies and Lifelong Learning;
- Teachers' and learners' competences in distance learning and computer science;
- Use of e-learning in improving the level of the students' key competences;
- Pedagogical – didactic aspects of e-learning and their use in the development of the key competences;

- Distance learning of humanities; distance learning of science and mathematics;
- E-learning for the disabled; the use of virtual classes for people with limited abilities and special needs;
- Psychological, social, ethical, cultural and legal aspects of distance learning;
- Methods, forms and techniques in distance learning;
- Teacher-student and student-student relationships in distance learning;
- M-learning - real state and development prospects;
- Multimedia means and tools in distance learning; technology and methodology of video-tutorial design;
- Others

The monograph includes the best pieces of work, prepared and presented by the authors from six European countries during the scientific conference entitled ”*Theoretical and Practical Aspects of Distance Learning”,* subtitled*: “Use of E-learning in the Developing of the Key Competences”,* which was held on 10-11.10.2011 at the Faculty of Ethnology and Sciences of Education in Cieszyn, University of Silesia in Katowice, Poland.

The speakers were from Constantine the Philosopher University in Nitra (Slovak Republic), Matej Bel University Banská Bystrica (Slovak Republic), University of Ostrava (Czech Republic), Silesian University in Opava (Czech Republic), University of Silesia in Katowice (Poland), Warsaw University (Poland), University of Ss. Cyril and Methodius, Trnava (Slovak Republic), University of Žilina (Slovak Republic), Gdansk University of Technology (Poland), Church Pedagogical Institute in Graz (Austria), University of Defence in Brno (Czech Republic), Maria Curie-Skłodowska University in Lublin (Poland), Higher School of Ecology and Management in Warsaw (Poland), Kazimierz Wielki University in Bydgoszcz (Poland), Zrinyi Miklós University of Defence (Hungary), Cracow Pedagogical University (Poland), Jesuit University of Philosophy and Education "Ignatianum" in Cracow (Poland), Warsaw School of Social Sciences and Humanities (Poland), Higher School of Occupational Safety in Katowice (Poland), AGH University of Science and Technology (Poland).

Among the authors are well-known scientists, young researchers, academic lecturers with many-years’ training and experience in the field of e-learning,

PhD students, the creators of distance courses, multimedia teaching materials, web-sites and educational sites.

I am convinced that the monograph will be an interesting and valuable publication, describing the theoretical, methodological and practical issues in the field of using e-learning in developing key competences, giving proposals of solution of some important problems and showing the road to further work in this direction, allowing to exchange experiences of scholars from various universities of many European countries.

Publishing this monograph is a good example of expansion and strengthening of international cooperation. I am very grateful for valuable remarks and suggestions which raised the quality of the publication. Here I especially want to thank Prof. Maciej M. Sysło – a reviewer of this monograph, Prof. Robert Mrózek for an editorial correction, MA Andrzej Szczurek for help in the edition of this publication. Also I say 'thank you' to the authors for the preparation and permission to publish their articles. All readers I wish a pleasant reading time.

Thank you.

Eugenia Smyrnova-Trybulska

I. E-LEARNING IN THE DEVELOPMENT OF THE KEY COMPETENCES

COMMUNICATION DURING LIFELONG LEARNING. DEVELOPING COMPETENCES - SUPPORTED BY DISTANCE LEARNING

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Abstract: *"All real living is meeting" (Martin Buber).The ability to communicate and to build bonds between people starts in the womb. A mother and her unborn child permanently communicate with each other through division of cells. Infants and toddlers develop better, when the mirror neurons are better promoted. The different starting conditions of life and the child's development are dependent on the social situation and also on the culture. Therefore, the task of a (mandatory) kindergarten program is to compensate for deficits and to create a certain balance to provide similar learning conditions for all children. At school, the question is when and where a PC is helpful to promote competences.*

Keywords: communication, prenatal communication, mirror neurons, education, relationship.

INTRODUCTION

Annäherung an die Wirklichkeit	Getting closer to reality
nicht durchblicken	not looking through
sondern anblicken	but looking at
nicht im griff haben	not having under control

vielmehr ergriffen sein	but more being deeply moved
nicht bloß verstehen auch zu dir stehen	not just understanding but standing by you
nicht durchschauen einfach nur anschauen	not looking through just looking at
so werden wir wirklich wir	so we really become ourselves

(Knapp 2002, 59)

The paper intends to show whether and how the competences with their four dimensions (knowledge, will, motivation and sociality) can be correlated with the popular concept of intelligence by Howard Gardner, in the issue of lifelong learning, especially learning in relationship and communication. We use a notion of learning that covers the key learning and development opportunities, especially in communication.

According to the clarification of the concepts of competence, intelligence and learning we therefore assume that:

- the infant in the womb communicates with the mother; we refer to the current researches on prenatal rate;
- in the primary socialization (family) children have different starting conditions in life and thus have different opportunities for acquiring competences;
- the kindergarten is a great chance for compensating deficits in learning opportunities and promoting talents;
- in the school – according to awareness of the heterogeneity and individuality of the pupils – the different gifts and multiple intelligences have to be promoted;
- lifelong learning in Geragogik - combined with movement, music and biographical learning – helps to develop the brain's plasticity.

1. COMPETENCE, INTELLIGENCE AND LEARNING – DEFINITIONS

1.1 Competence

Competence (Latin‘competere’: meet, to be enough, to be capable of something, to be entitled to) stands for (professional) competence and skills in general and in the educational context.

"It's not about whether the particular curriculum is seemingly ‘fulfilled', but the fact that the students actually acquire skills and knowledge. And that skills and knowledge they need in order to orient themselves in the world make reasoned decisions and then also ‘to cope with tasks and situations', which the school does not set but ‘life' sets them, now and in future" (Klieme 2010).

Primarily in response to the PISA study in 2000/2001**,** the concept of competence has become increasingly important in education theory and education policy in the German language area. It's about the concept of educational standards, which requires a model of competences. In this context, based on the concept of competence, is the Franz Weinert’s definition: "The individual who possesses or can learn cognitive competences to solve specific problems, and has the associated motivational, volitional and social readiness and skills can use them for problem solving in a variety of situations successfully and responsibly" (Weinert 2001, 27f.).

There are four key aspects in this definition:

knowledge,

motivation,

will / volition and

social component.

There are also understanding, ability, experience and action included.

Above all, it is the connection between knowledge and skill that makes one ‚competence', as an ability to cope with situations and tasks.

1.2 Multiple intelligences

For a long time cognitive skills were primarily forced at school - they were in the form of intelligence quotient (IQ). In this (cognitive) range, the competence and intelligence terms must be seen largely in parallel.

In 1983, Howard Gardner postulated in his book "Frames of Mind" seven varieties of intelligence. Since then, the cognitive was no longer viewed solely as a single intelligence.

Particular emphasis was given to the concept of intelligence by Daniel Goleman who coined the term emotional intelligence (EQ). Daniel Goleman's components of emotional intelligence are: self-regulation, self perception, motivation, social skills, empathy.

Ian Marshall and Danah Zohar see the people with their ability to transcend themselves. They created the concept of spiritual intelligence (SQ).

A parallel can be drawn between the cognitive competence and the IQ or with the logical-mathematical and linguistic intelligence and they can be used almost interchangeably.

Furthermore, the social competence is largely identical with the interpersonal intelligence.

In contrast, the volitional element and the motivational aspect are not available at the Gardner's multiple intelligences. In our view it makes sense to perceive the overlap of competences and intelligences.

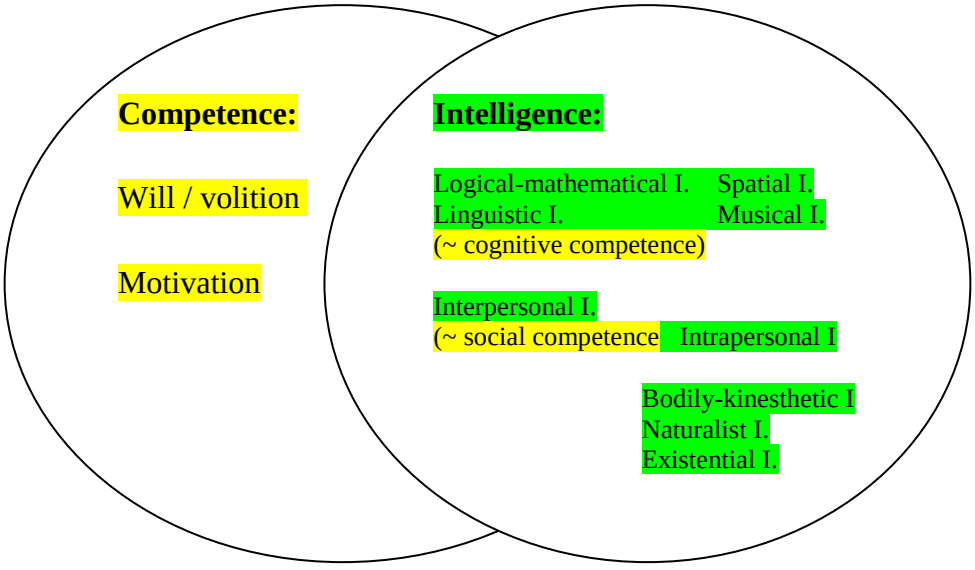

Figure 1. The overlapping of competences and intelligences.

Source: own, Feiner - Resnik 2011

The areas of competence and intelligence can be seen in their diversity, but we wonder whether or not the volitional competence could be considered as

intelligence (as it has not been explored and described yet) and also the motivational aspect which is playing a big role in psychology and education, but it has not become established in the intelligence discussion so far.

1.3 Learning and Communicating

We convert the words of Martin Buber, "All real living is meeting" (Buber 2008, 12) in terms of learning: "All real learning happens at the encounter." For Martin Buber only those who learn to say ‘Thou’, even can say ‘I’. “Saying ‘Thou’ I am becoming ‘I’” – “Ich werde am Du zum Ich”. With Buber's statement that "With ‘Thou’ Man becomes ‘I’” – Der Mensch wird am ‘Du’ zum ‘Ich’” (Buber 2008, 28) it is clear that development of identity happens only from the relationship to ‘Thou’. Therefore, we are convinced - on the basis of Martin Buber – that all significant learning is dialogical. And this is from the very beginning, by the fusion of sperm and an egg cell and the cell division in the womb.

2. PRENATAL COMMUNICATION – INTERPERSONAL AND MUSICAL INTELLIGENCE

“In the beginning there is the relation.” (Buber 2008, 18)

The period of childhood is associated with the terms ‘growth’ and ‘development’. Biologically speaking, the ‘growth’ is an advanced development of a living being or part of the organism from the earliest stages to maturity. Growth is the enlargement of an organism. And the ‘development’ is defined as a result of cellular differentiation. This enables the creation of specific structures and functioning of organ systems (Tratar 2007).

The prenatal development begins after fertilization when the first independent development of a new human organism starts.

The term development refers not only to the physical development of the individual but to his mental development as well. In recent years this has been the subject of scientific study and the researches has increased significantly (neurobiology).

Strong feelings of the mother (increased stress and constant fear) are working on the unborn child in the womb biochemically and leave certain impressions on him. “Stress leads to agitation and this constant agitation causes the disease of the soul” (Kiewald 2008).

The ability to communicate and to build bonds between people starts in the womb. A mother and her unborn child permanently communicate with each other through division of cells.

We should not ignore the development of a child in the prenatal period. This period is important for developing different channels of perception as well as the first motor activities (Kiewald 2008). Little human being can move after 10 weeks. He can accept contacts with his mother through the skin. He can see (the distinction of light and dark). He can taste. He can hear (e.g. sounds, heartbeat, stomach's rumbling, mother's voice).

When mass media point out the danger of smoking, alcohol, drugs, etc. during pregnancy, they should more often write about the importance of a healthy attitude of parents, spouses between themselves and towards the community. They should also write how music (Vivaldi, Mozart, etc.) helps the unborn baby to calm down (Verny U. Kelly 1984 at Kiewald 2008) and how warm and safe family environment contributes to a healthy physical and mental development of a child.

3. EARLY CHILDHOOD – BODILY, LINGUISTIC AND SOCIAL INTELLIGENCE

Motoric development can be observed in the first year of life. "The child insists again and again to raise his own body and trains the muscles. This accelerates his development" (Rogge 2006).

Psychological development of children can be observed already by the end of the first year. The child reveals that he is an individual and that there are different people around. He observes the surroundings, he learns if he can trust someone or not.

During the child's second and third year of life not only motor functions are developed but the foundation for mental, social and linguistic development is established as well.

Database of positive feelings and experiences provides more satisfying life later. And at the same time various intelligences (linguistic, existential, rhythmical etc.) are acquired.

Why can we understand each other intuitively? Why do we feel instinctively what others feel? And why do we act socially and for the good of all? The explanation of all these phenomena is found in mirror neurons which were accidentally discovered in 1996. These neurons enable us to be in emotional resonance with others, provide us with intuitive knowledge about people´s

intentions close to us and let us share their joy or pain. They are the basis of empathy, intuition and the ability to love.

In order to participate in other people´s feelings, "our own nerve cell nets are put into resonance and are made to vibrate, which lets the feelings of other people to appear in our own mental experience" (Bauer 2006, 51).

When does this ability begin to develop? "With its astonishing ability to imitate right from its first days of life the baby has the possibility to get involved in an interplay that leads to develop first interpersonal relationships" (Bauer 2006, 58).

Already a two-month-old baby searches for an agreement and it develops the basic feeling to be in an intuitive contact with similar beings and to live in a common emotional world. Being three months old, the baby develops "a feeling that its own expressions of life can cause changes in the related people´s behavior" (Bauer 2006, 63).

However, if no emotional resonance is possible, an autism can occur: "The deficiencies of children and grown-ups suffering from an autism can exactly be found in these abilities based on the function of the mirror neurons" (Bauer 2006, 73).

To sum up: Maybe most of the bodily intelligence is developed in the first year of life.

4. THE COMPETENT CHILD – THE COMPETENT FAMILY

The Danish family therapist Jesper Juul, best known for his publications about the competent child (Juul 1997) and the professional family (Juul 2007), is one of the most common educators.

His training was gestalt-therapeutic oriented and he did it with Walter Kempler, Fritz Perls' co-worker. Juul helped Kempler to establish the Kempler's Institute.

The 50 employees of the Institute help parents to find new ways in education. Jesper Juul assumes that from his birth a child is socially and emotionally as competent as an adult. Juul's concept is to find out who is the child. His goal is to give children words with which they can express their existence. "They don't need words for their problems, but for what they are. They must be able to express their being in the world" (Juul 1997). Jesper Juul supports the idea that children should be returned to their competences.

Parents live their competences best when they look after the quality of their relationship. This is important for children's healthy growth and development because children hate to see the disharmony between parents. Parents should ask themselves: "What do I believe? What are the real needs of people? What are the values that my parents gave me, which of those are proved to be constructive, and what should I throw overboard?" (Juul 2007 19).

5. KINDERGARTEN – COMPENSATING DEFICITS

"The personality of man is not a static stage, or security fence in life. Personality is both stable and flexible, identical and variable. With the participation of different dimensions of a man (physical, psychic, mental), the personality develops and changes under the environmental influences. The results of this alternating process can be found in the embodiment - structurally in the personality and timely in the biography. Development, design and modification of an individual personality is not a mechanical but a creative process" (Richter 1997, 40 in: Reithofer 2011, 4).

Different starting conditions of life and the child's development are dependent on the social situation and also on the culture. Therefore, the task of a (mandatory) kindergarten program is to compensate deficits and to create a certain balance to provide similar learning conditions for all children.

The analysis was performed in a kindergarten with two key questions: What competences do children of different ages have before they enter the kindergarten? And the second: What competences do they acquire in the kindergarten? The questions were answered by the kindergarten teachers from Styria (Austria). A sample is not representative. Here are the results of the analysis (Table 2):

Table 2:

How many competences does a child bring in the kindergarten? Ration of 0 (= none) to 10 (very strong)

	Under 3 years	3 - 4 years	4-5 years	5–6 years
Cognitive Competence	7	7	6	
Motivational Competence	4	9	7	
Willing Competence	8	4	7	

Social Competence	4	2 – 3	Boys: 6 Girls: 7	
Linguistic Intelligence	9	3	7	
Logical-mathematics I.	5	2	6	
Spatial I.	5	3	6	
Bodily-kinestetic I.	6	5	8	
Rhythmical-musical I.	4	7	8	
Meditative I.	2	3 – 4	4	
Naturalistic I.	2	7	5	
Existential I.	1	7	6	
Spiritual I.	0	10	8	
Comment:				Was not possible to observe

Source: own, based on investigation Feiner - Resnik in June 2011

Comment: The competences of children always depend on social circumstances, family background, interests, environment etc.

Table 3:

How many competences does a child acquire in the kindergarten? Ration of 0 (= none) to 10 (very strong)

	Under 3 years	3 - 4 years	4-5 years	5–6 years
Cognitive Competence	10	10	8	8
Motivational Competence	8	10 +	7	9
Willing Competence	6	10	7	8
Social Competence	10	8	9	9
Linguistic Intelligence	10	7	7	9
Logical-mathematics I.	9	7	8	8

Spatial I.	7	8	7	9
Bodily-kinestetic I.	10	10	9	10
Rhythmical-musical -I.	6	10	10	10
Meditative I.	0	9	9	8
Naturalistic I.	9	10	10	9
Existential I.	4	7	7	8
Spiritual I.	0	10	8	9

Source: own, based on investigation Feiner - Resnik in June 2011

Comment: Three to four year old children have to learn to integrate themselves into the group, social values are more prominent.

The total support in the kindergarten involves addressing / conveying all competences. Each child brings a variety of interests, comes to us with specific needs, skills and abilities.

There is an interesting fact of kindergarten teachers' *observations concerning the life motivation of kindergarten children (Table 4):*

Table 4:

Life motivation. Ration of 0 (= none) to 10 (very strong)

	Under 3 years	3 – 4 years	4 - 5 years	5 – 6 years
Life-motivation	8	9	10	7

Source: own, based on investigation Feiner - Resnik in June 2011

How can kindergarten teachers help with life-motivation? They can help children by:

- Allowing curiosity and supporting children - this is the basis for all learning.
- Turning even more to each individual child; taking care that each child in the group is involved. The child should be able to perceive a pleasure of life.

- Emotionally, socially, they can bring a good measure of "ego" in the group.
- Providing safety and security, the child should feel to be accepted; showing understanding in all things, providing fun and humor to create a stable and feel-good atmosphere for the child.
- Providing opportunities that serve the children as a basis of experience.
- Safety, security, strengthening of the personality, rules.
- Values and jointly established group rules, household, group independent (social skills), building resilience, conveying vitality.

Nowadays one of the most investigated things is the influence of mass media, especially the influence of the computer on the children. We got interesting results:

What kind of relationship have children in the kindergarten with the PC? Ration of 0 (= none) to 10 (very strong)?

Table 5:

Relationship of the children with the PC. Ration of 0 (= none) to 10 (very strong)

Under 3 years	1	Does using a computer make sense?
3 – 4 years	10 / 6	
4 - 5 years	9	Some electronic devices like mobile phone or Nintendo are used by 4 year old children.
5 - 6 years	8	

Source: own, based on investigation Feiner - Resnik in June 2011

In the educational literature there is a broad consensus: Language acquisition is learnt best through communication with real people, i.e. the verbal-linguistic intelligence primarily acquired by direct, i.e. 'face-to-face communication' (cf. Korte 2009, 275).

The question arises: When does it make the most sense to bring children close the computer - in kindergarten, primary school or even afterwards?

Children learn to speak and walk, to feel warmth and tenderness, they perceive feelings in interaction with the environment and to express their experiences. If the water in the tub is hot or cold, you learn just by touching it. “Before you have had this experience computer images are incomprehensible. Social skills are learned best with real playmates, not by looking at other children on the screen" (Korte, 2009, 276). The computer does not help to ‘understand’ the world. "Children need to have their first own experiences with the world in the early years of life, in the kindergarten and also in the early years of elementary school. Until then they cannot represent them properly in their brains. Only when children have a rough idea of the processes in the real world, with real people and objects, virtual worlds will help them in learning. Towards the end of primary school it is still early enough to become familiar with computers" (Korte, 2009, 276).

6. SCHOOL: EDUCATION CREATES BINDING OR EDUCATION THROUGH RELATIONSHIP

In German language it’s a play on words: *Er-ziehung durch Be-ziehung.*

In the kindergarten the child gets the experience that his individuality is perceived and he learns to be incorporated into a larger social unity. This should continue in the school. – But isn’t there often a gap between desire and reality? “At school they will recognize and appreciate me as someone who is unique in the world, unmistakable. I'm going to be something different, I give something that would not exist without me.

But then, all children always have to do the same in class, the same look, the same show, they have to give the same. Not the particular one, the unique but ignorance, changeability, mandatory.” (Andresen ^{4}1991, 54).

For too long school pursued the goal that everyone should learn at the same normative level. School was not aware of different gifts and talents.

In 1994, there was a paradigm shift. Worldwide they agreed on a guiding principle not to exclude anyone, and the radical heterogeneity was taken seriously. The organization of the UN for Education, Science and Culture with 92 governments signed a guiding principle: “The guiding principle that informs this **Framework** is that schools should accommodate **all children** regardless of their physical, intellectual, social, emotional, linguistic or other conditions. This should include disabled and gifted children, street and working children, children from remote or nomadic populations, children from linguistic, ethnic or cultural minorities and children from other disadvantaged or marginalized areas or groups. These conditions create a

range of different challenges to school systems" (Salamanca Statement 1994, 6).

And we consider Howard Gardner's concept the best to promote the individual talents and gifts. Our Thesis: School is due to promote a variety of skills and intelligences!

Logical-mathematical Intelligence: Real problems and fictive conflicts help to exercise this kind of intelligence.

Spatial Intelligence can be developed, when school is not so much a workplace education area, but a living room (Hammerer 2011).

Bodily-kinaesthetic Intelligence: Many children have ADHD due to lack of exercise. A big danger is an excessive use of PC and computer games, so that many of them become computer game addicted. Schools must become a school of movement again.

Musical Intelligence: Singing leads to increased production of oxytocin ("hormone of love"), cortisol (blood pressure and heart rate) is also decreased by singing and the "hormone of aggression" testosterone is reduced (Bossinger 2006, 49f.).

Intrapersonal Intelligence: The combination between being active and being meditative is e.g. given by painting. In English the word 'recreation' means creating something new but also relaxation and free time.

Interpersonal Intelligence: Education creates relationship, "education can bring together people with different backgrounds, can help to broaden each individual's horizon and help to build bridges between generations and between sexes, between cultures and religions". A task of the educational system is "to promote human sensitivity and the ability to be engaged in meaningful conversation." (Ökumenischer Rat der Kirchen 2003, 21 and 25).

Linguistic Intelligence: Learning the mother tongue and foreign languages is possible through the learning of vocabulary and grammar, but you must communicate in order to practice the language as well. After learning language face-to-face, the PC can help a lot to develop linguistic intelligence.

Naturalistic Intelligence: Pupils should learn to appreciate the environment, religious people believe that nature is given by God, it's God's good creation.

Existential Intelligence: It's crucial to find a sense in one's own life – and school can help.

Which intelligences does a computer help to develop most?

Developing multiple intelligences is important for general education and for employability. Nowadays a lot of intelligences are required in professions.

7. LIFE LONG LEARNING

At work, in the professional competence you must show that you have mastered the needed intelligences well. In any case, the cognitive skills of a craftsman should not be undervalued. For example, when building our house a bricklayer was far superior to me as academics in reading the plan.

In the past you were trained for one profession – and this profession was practiced for four decades.

Today: Diverse competencies should be acquired and there is hardly a profession where the PC is not needed.

8. GERAGOGIK

One of the loveliest and most fascinating films on this issue, how old people regain their motivation in life, is the film "Herbstzeitlosen" (Late Bloomers) from the year 2006. An old woman realizes her childhood dream with others: a lingerie boutique. As the village is too small for the profitability, they attend a computer course and offer their self-produced goods on the internet. A refreshing comedy about age, wishes and the pure joy of life.

We made a small qualitative research in several nursing homes in the Steiermark (Austria). Our main interest was the question: *What helps most to conserve the motivation for life and what's the role of the PC?*

Table 6:

Which kind of competences / intelligences do old people bring in the nursing home? Ration of 0 (= none) to 10 (very strong)

Highest rate:	
Willing Competence	6,91
Naturalistic Intelligence	5,08
Linguistic Intelligence	5,75
Lowest rate:	
Logical-mathematical Intelligence	3,58
Spiritual Intelligence	3,41

Meditative Intelligence	3,08

Source: own, based on investigation Feiner - Resnik in June 2011

Table 7:

Which kind of competences can an old person acquire in the nursing home? Ration of 0 (= none) to 10 (very strong)

Highest rate:	
Naturalistic Intelligence	6,75
Willing Competence	6,58
Social Competence	6,41
Lowest rate:	
Spatial Intelligence.	4,41
Meditative Intelligence	4,33
Logical-mathematical Intelligence	3,08

Source: own, based on investigation Feiner - Resnik in June 2011

What kind of relationship have old persons in the nursing home to the PC? Ration of 0 (= none) to 10 (very strong)?

There was no relation to the PC at any age, neither at 65 nor at 70, 75 or older.

We were very surprised about this result, because PC with the internet could be a valuable window to the wide world.

Then we asked them about the life motivation:

Table 8:

Which life motivation, desire to be alive, the elderly bring when entering the nursing home ? Rating of 0 (= barely present) to 10 (very strong)?

Life motivation:	3.625

Source: own, based on investigation Feiner - Resnik in June 2011

There is a big difference between life motivation in the kindergarten and in the nursing home.

Very interesting answers were given to the last question:

What helps the most and what you can do in a nursing home in order to maintain elderly people's life motivation?

Traditional festivities, contacts with animals (cats), group events (singing, crafts ...), music, games, artistic activities, animation, intensive psychological care. "Not to see the old people as an object or subject of the job, but as a living person, as myself and to live s great deal with the elderly".

Personal communication, movement, music, contact to animals ... seem to be very important for the will of life.

Biographical learning in nursing homes is highly significant, so that memory is activated and stressful life stories will be processed (Specht-Tomann 2009).

8.1 Movement as a basis for plasticity of the brain – Bodily intelligence

Physical activity contributes to the regeneration of neurons in the brain, particularly in the hippocampus, the centre of life motivation. This was explored through the "movement neuroscience," one of Wildor Hollmann's branch of science, created in 1985.

Depressed people are often less motivated, they exercise too little and the number of neurons gets less steadily for this reason. But the brain is able to form new neurons. After two hours of running endogenous opioids are formed, that is the body itself forms substances that have an analgesic effect.

Physical activity reduces the risk of getting Alzheimer's disease by 60 percent. More and more psychiatrists supplement their psychological treatment by exercise therapy. Physical activity is promoted and the blood circulation- which one could not imagine fifteen years ago- stimulates neurogenesis. One speaks of plasticity and regenerative capacity of the brain (Lifelong Learning, 2010). The saying: "You cannot teach an old dog new tricks" has lost its validity. Lifelong learning is not only possible but also neurobiologically well-founded. Through physical activity well-being improves and the cognitive skills increase. Good mood and increased retention go hand in hand (Runthebrain 2010).

8.2 Musical Intelligence

Our youngest son Martin made his civil service in two nursing homes. The most impressive experience was when he sang the 'Kaiserhymne' with a very old woman. She began to feel very happy and she started to remember her youth in the monarchy time before 1914.

Wolfgang Bossinger, who wrote the book about healing songs (Bossinger 2005), has been working at a clinic for psychiatry and psychotherapy for more than 20 years; he founded the association "Singing hospitals Inc.,". He promotes the healing process and gaining memory as the beneficial effects of singing.

CONCLUSION

In his bisexuality the human being is interrelated. I am as a person created from the physical communication and relatedness of two people. And the life develops in the process of communication with the fertilized egg of the pregnant woman, the expectant mother with the child developing in the womb. Communication between mother and child is practiced from the very beginning in the womb, from the daily division of the cells (Dohr 2007).

The decisive feature of the biological body is the DNA that is created in pairs. It is clear that man is created in relation. The neurobiologist Joachim Bauer shows that the person is not so much created for competition and "survival of the fittest" but more for cooperation, communication, and creativity (Bauer 2008).

From the early childhood on it is crucial that the mirror neurons are activated. The better the communication between the first "related person" and the child is, the better mirror neurons can be developed. With the representation of the mirror neurons Bauer makes them striking visible. "Not that we survive at all costs, but that we find other, bind our feelings and desires and specular return is the mystery of life" (Bauer 2006, 173).

Just a few years ago, the neurobiological centers for living will, energy, motivation and desire were found: The motivation of dopamine makes us want to do something and show us to exert power. The body's own opioids ensure that we feel good, physically and mentally. And oxytocin causes that we feel friendly connected to people. This "ingenious trio" (Bauer 2007, 19) causes life will and motivation to develop different intelligences. That was the reason why it is our concern to put in the relationship the concept of competences (with the factors will, motivation, cognitive and social aspects) and the concept of Howard Gardner's multiple intelligences.

We plead for a combination of the term competence and intelligence: We are competent, when we can realize different /multiple intelligences.

Maybe even it is senseful to create the term will-intelligence and motivation intelligence.

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CROSS-CURRICULAR INTEGRATION OR SEPARATION IN TEACHER TRAINING. WORKING TOWARDS A MODEL FOR DEVELOPING COMPETENCE-SKILLED TEACHERS

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Abstract*: Key competences for lifelong learning, similarly to other cross-curricular approaches such as CLIL, introduce the necessity for multi-disciplinary teaching. The question arises whether contemporary language teacher education actually prepares teachers to cross the boundaries of their subjects and apply the principles of key competences in practice. The aim of the present paper will be to present a proposal for training teachers to become prepared to implement competence-oriented teaching. The use of a Moodle-based e-learning component, together with student team projects, will enable instructors to raise the effectiveness of competence-oriented teaching. The presentation will illustrate didactic innovations introduced in "www.praktyki.wh.umcs", EU-funded regional project aiming at preparation and implementation of innovative teaching practice curriculum at Maria Curie-Skłodowska University, Lublin, Poland.*

Keywords: key competences for lifelong learning, e-learning, teacher training.

INTRODUCTION

Practical training of student teachers often does not get enough attention from the university faculty on the one hand and the very students on the other. Teaching practices are sometimes downgraded, trivialised or even pretended

as a result of inadequate supervision of university staff or inappropriate attitude of student teachers or their school mentors. As such, there is a clearly perceived need to modernise the teaching practice curricula, to introduce innovations maximising the effectiveness of practical training and increasing cooperation between universities and schools.

At the same time, new educational challenges such as the promotion of the idea of cross-curricular teaching with the focus on key competences for lifelong learning need to be incorporated in university curricula, to make sure student teachers are up-to-date with the requirements faced by teachers at schools. In the present paper, we show how these influences can be reconciled by implementing e-learning as a mode of delivery and a Virtual Learning Environment as a space for online instruction in promoting the idea of key competences for lifelong learning among student teachers. The paper is based on the findings of the "www.praktyki.wh.umcs" project - Preparation and implementation of innovative teaching practice curriculum at Faculty of Humanities, MCSU, co-financed by the European Union from the European Social Fund.

1. KEY COMPETENCES FOR LIFELONG LEARNING – A CHALLENGE FOR TEACHERS?

Key competences, defined in *Recommendation* (2006) as a combination of knowledge, abilities and attitudes relevant to given situations (Okońska-Walkowicz 2009), are necessary for pupils for personal development, as well as social integration and employment. According to the *Recommendation*, "initial education and training offers all young people the means to develop the key competences to a level that equips them for adult life, and which forms a basis for further learning and working life" (p.11). Key competences are equally important and interrelated since the abilities related to one support the abilities pertaining to the other. *Recommendation* (2006) defines eight key competences:

1. communication in the mother tongue,
2. communication in foreign languages,
3. mathematical competence and basic competences in science and technology,
4. digital competence,
5. learning to learn,

6. social and civic competences,
7. sense of initiative and entrepreneurship,
8. cultural awareness and expression.

The description of each competence embraces its definition, alongside with the knowledge, abilities, and attitudes related to it. *Recommendation* also features a shift of attitude to spreading knowledge. According to Okońska-Walkowicz, Plebańska and Szaleniec (2009), shaping the attitudes suggested in *Recommendation* requires that schools go beyond the scheme: assigned - learnt - checked. Key competences are not only better suited to everyday life reality but they also give teachers more freedom to discuss the most essential aspects of various contexts, be it ecology, history, or a foreign language; and this also includes the ability of matching the content to the context of a given school type.

It is also worth noting that the "new" Core Curriculum's focus on shaping key competences is a follow-up to the well-established foreign language didactics traditions, aiming at integrating language education and content. However, as opposed to interdisciplinary streaming in the "old" Core Curriculum before 2009, competence listings no longer include rigid sets of topics which teachers had to implement in their classes. While the interdisciplinary streaming approach seemed too restrictive in its attitude, and school administration often focused too much on the accomplishment of cross-curricular topics at the expense of "subject" topics, it needs to be stressed that the definitions adopted in *Recommendation* alone might be too difficult to interpret by teachers, let alone students.

Thus, as we see it, the major challenges to be tackled as far as educating student teachers for developing key competences of students at schools might be the following:

1. analysing definitions of particular competences and formulating aims and objectives most relevant for given teaching contexts;
2. balancing aims and objectives from step 1 as far as knowledge, skills and attitudes connected with particular competences are concerned;
3. finding topics to realise aims and objectives adopted and matching coursebook contents to these;
4. searching for and evaluating language materials used to conduct competence-oriented teaching;
5. creating exercises and ordering them into lesson sequences.

All of these challenges will be tackled only if teachers have the necessary knowledge in the area of the competence themselves. This does not have to be obvious even within the sphere of communication in the mother tongue, as teachers-native speakers of Polish might not have the necessary meta-linguistic awareness. When more content-rich competences are taken into account (such as, for instance, entrepreneurship or digital competences), the issues of expert knowledge and specialist language used to express it are even more formidable. It is this very issue that we expect to be addressed with the use of student teams working in collaboration via an e-learning platform. Also the challenges described in the list above can be successfully managed if a self-study component with interactive exercises and examples of good practice for analysis is employed as a part of teacher training.

Even though the current teacher education system has some provisions for multidisciplinary integration, and should theoretically prepare teachers for cross-curricular instruction, it does not fully meet its assumed objectives. So-called "double programmes" (e.g., English studies with culture education or Polish language and literature with history) contain separate methodology training in the two subjects with no connection or correlation between these. Thus, in the present paper we attempt to show some opportunities for exploiting the existence of "double programmes" for cross-curricular integration towards key competences for lifelong learning.

2. INTEGRATION IN TEACHER TRAINING - TOWARDS CREATING COMPETENCE-SKILLED TEACHERS

Key competences for lifelong learning, as summarised above, have become nowadays one of the most formidable educational challenges posed for teachers at all levels of education, including student teacher development at tertiary level. Meeting this challenge necessitates searching for new approaches and solutions, which would facilitate effective accomplishment of objectives and tasks connected with this vital area of university education.

The strategies of developing student teachers implemented so far, according to different researchers (Banach 2003; Włoch 2005), do not fit the contemporary post-modern reality, as they do not meet social expectations voiced towards schools and teachers to a sufficient extent. Moreover, these strategies and approaches are not quick enough to adapt to the changes occurring in the fast-developing world. As a consequence, as is noted by Michał Śliwa (EduFakty.pl, 2010), there is still a severe lack of modern vision of teacher education, which would respond to and confirm the

innovative changes taking place in this area of social life.

It needs to be stressed at this point that teaching practices are an immensely important, yet often underestimated, aspect of teacher education. Thus, it is often postulated that practical training, implemented via teaching 'in practice' and 'through practice,' be provided with higher quality and greater effectiveness thanks to implementation of innovative curricula, new organisational measures and novel evaluation techniques.

Since we fully agree with this diagnosis as well as other similar views voiced nowadays, we have undertaken an innovative project striving towards improving the quality of teaching practice implementation together with teacher trainers from all institutes of the Faculty of Humanities, Maria Curie-Sklodowska University, Lublin, Poland. The project "www.praktyki.wh.umcs - Preparation and implementation of innovative teaching practice curriculum at Faculty of Humanities, MCSU" is co-financed by the European Union from the European Social Fund, within the framework of Operational Programme Human Capital, 2007-2013, Priority III High quality of system of education, Action 3.3 Increasing teaching quality, Subaction 3.3.2 Effective system of teaching and training teachers. The project encompasses improvement of both observation practices and teaching practices, within all the areas that are necessary for successful teacher development (pedagogy, main subject, supplementary subject).

While composing new ways of organising the practical aspect of training, the current descriptions of European Qualifications Framework for Lifelong Learning (European Commission, 2008) are an important source of inspiration and point of reference. These frameworks motivate trainers to construct and model large-scale educational solutions, understood here as integral systems or models of interrelations aiming at achieving specific learning objectives, such as developing teaching competence. These systems need to be closely connected with a particular faculty of studies and current socio-cultural reality in a functional and interdisciplinary way.

The question of cross-curricular integration as a notion to be understood and operationalised for practical teaching at schools has entertained a lot of interest in literature and has triggered a number of studies on its practical implementation. The authors generally agree that the idea of cross-curricular integration, when implemented in teacher training, has a positive effect on the process and effectiveness of training.

However, cross-curricular teaching has different definitions and implementation procedures. In a most general, theoretical, sense, the notion

of integration in education is identified, among others, as the following (Kurczab 1993; CODN, 1999):

- the process of merging loose and separate entities into a single whole, for instance, integrating a set of educational actions connected with training teachers within the areas of pedagogy, didactics and methodology with a close relation to the contents of a specific field of study or related areas (as is the case with so-called 'double programmes', such as the Polish language and literature with history, the Polish language and literature with culture education or English studies with culture education);

- the name of a particular quality characteristic of the structure of certain aspects (for instance, of aims, materials, training effects), which become coherent thanks to integration, so that a logically organised network of relations, meanings and contexts is created.

The need to verify and constantly update teacher development strategies to the conditions of the changing world is underlined in different studies on the Polish educational system. Also due to Poland's functioning in international education-related frameworks the ways student teachers are prepared at university needs to take account of wider innovative aspects. It is believed that "teacher development that has a traditional and exclusively national nature is currently insufficient, as it does not enable trainers to induce students to establish links in international collaboration which is put forward by UNESCO as one of the major aims in education and human rights" (cited after Włoch, 2005, p. 222).

Many aspects which have a negative influence on the effectiveness of the teacher development process result from failing to implement the idea of integration. These are, among others, the following:

- a transmission-oriented model of knowledge transfer, where knowledge is chunked into small bits coming from narrowly-specialised subjects, with simultaneous failure to equip prospective teachers with the ability to select, integrate and adapt knowledge to the reality of education at school, as well as needs and expectations of students;

- lack of correlation between theoretical and practical dimensions of the teacher development process, often accompanied by excessive theoretical focus, inadequate currency of knowledge, insufficient applicability for school teaching;

- failure to develop student teachers' emancipatory competences (Czerepniak-Walczak 1994), manifested in such personality features as entrepreneurship, courage, reflectivity, creativity, innovation, readiness to act

unstereotypically, willingness to consciously reject limitations, perception of need for and capability of self-assessment of the effects of undertaken actions and ability to come up with solutions;

- insufficient or missing innovative solutions, systems and curricula, which would put teachers' practical training in its right place in the process of forming professional competence.

3. THE STUDY

3.1 The aim of the research

The major aim of the present study, as a part of a wider research project on investigating the impact of proposed innovations in teaching practice implementation, was to find out ways of preparing student teachers for developing key competences for lifelong learning at schools. At the same time, the feasibility of using e-learning for exposing students to competence-oriented materials and projects was to be researched.

3.2 The context of the study – "www.praktyki.wh.umcs project"

The project spans four years, since October 2010 until November 2014, and is targeted at all students of the Faculty of Humanities, both B.A. and M.A. level, studying teaching specialisation (starting 2010/2011), totaling not fewer than 3,280 students. Moreover, school teachers are to benefit from the project as well, as participants of free-of-charge specialized mentor training courses (not fewer than 360 teachers of different specialties) and subsequent school mentors in not fewer than 50 schools from the region of Lublin and the neighbouring areas.

The major aim is to be accomplished through a series of objectives with their corresponding hard and soft results. Thus, the starting point has been the formulation of innovative teaching practice curricula for students of Faculty of Humanities, MCSU (henceforth referred to as FoH) based on constructivism, action research, reflective practice, sex equality and current teacher training standards in Poland and the EU, thus introducing essential qualitative change in trainee preparation. As far as teacher trainees are concerned, introducing students to the current trends in pedagogy and teaching as well as their applications in school conditions, creating enhanced teaching practice environments through employing specially trained school teachers (mentors), together with the novel use of ICT tools to prepare, organize and manage the teaching practice, are all intended to increase impact of the practicum and expand students' practical knowledge.

The major objectives (hard results) of "www.praktyki.wh.umcs" project are the following:

1. Preparation of innovative teaching practice curriculum made up in consultation with experts, mentors and teachers.
2. Completion of a 90-hour mentor training course by 340 teachers.
3. Completion of teaching practice by 3,200 students of FoH, MCSU.
4. Publication of a book on innovation in teaching practice implementation.
5. Organization of a mid-project evaluation conference.
6. Writing an innovative teaching practice file for students, with materials related to pedagogy, methodology and sex equality in education.
7. Design of an e-Mentor interactive course developed on a Learning Management System.
8. Participation of 50 schools in teaching practice implementation.
9. Formulation of a strategy on further cooperation within teaching practice management made up collaboratively by partners.
10. Compilation of a database of schools and qualified teachers-mentors for future use in teaching practice management.

Out of the hard results summarised above, the point in focus in the present paper was the design of an e-Mentor interactive course based on *Moodle* Learning Management System, which would use collaborative activities of the platform to promote team work across FoH and expose student teachers to materials and tasks aiming at the development of key competences of their prospective students.

3.3 Design and procedure

To meet that aim, the first step of the process was to find out experienced teachers' attitudes to and views upon teaching practices at schools, which was accomplished through a series of group interviews throughout October-December 2011, separately for each institute of the Faculty. In the present study, we take into account only the data obtained by researchers from the Institute of the Polish Language and Literature and Division of Applied Linguistics. The participants were experienced primary and secondary school teachers, most with mentor experiences so far, with a varying number from 10 to 16 per a 4-hour interview session. In total, there were around 100

participants for both institutes.

The group interviews served a very important purpose of exchanging experiences between university and school, vital for diagnosing challenges that are faced by student teachers during their practicum to find ways to reconcile teaching theory with its practical dimension. Among others, the questions asked during the interviews were the following:

- What aspects of the current teaching practice format are viewed as needing improvement?
- What measures in terms of organization or design could ensure that students take a reflective part in practical teaching?
- What kind of methodology preparation would be needed for developing a fully competent mentor?
- What are some of the facilitative and debilitating factors influencing the effectiveness of student teachers' practical training?
- What innovative applications of Information and Communication Technology should be implemented to raise the effectiveness of preparing student teachers for practical teaching?

Out of all the questions above, the focus of the present study will be on the final aspect, namely attitudes and expectations towards ICT tools, and specifically e-learning as a mode of delivery of instruction and a Virtual Learning Environment as a platform for communication, cooperation and collaboration of student teachers, school mentors and university supervisors. In specific, we wanted to elicit mentors' opinions on whether at all and how in particular the idea of cross-curricular teaching can be passed on to student teachers in the online mode.

As the second step in the design of the e-learning component for training competence-skilled teachers, a needs and skills analysis pilot study has been conducted in the form of a semi-structured interview. The research was supposed to illuminate university supervisors' previous experiences with Virtual Campus of Maria Curie-Skłodowska University, their practice of computer-assisted teaching and online teaching, their expectations towards the implementation of the e-learning platform, their expectations towards the role played by teacher trainees and school practice supervisors, finally, the logistics of using the Virtual Campus in work contexts. Questions concerning prior experiences with e-learning, preferred activities and modes of work, as well as estimated share and workload of student teachers and school mentors, were supposed to lead to the informed design of the system.

The participants were methodology lecturers/prospective teaching practice supervisors of Faculty of Humanities, MCSU, all with Ph.D. or Dr habil. degree, with at least 10 years' experience. Out of the population of 35 respondents, it was possible to reach a sample of 25 subjects. The interviews were conducted both face-to-face and electronically via Skype in March 2011 using a mixed tool (the major report on the following study was presented at "Neo-philologies in the 21st century" conference, Tarnów, March 2011).

3.4 Presentation of results

The group interviews with experienced teachers aimed at, among others, eliciting mentors' attitudes and expectations towards the use of e-learning in student teacher training. The purpose of the researchers was here to investigate the possible role and function of a selected Virtual Learning Environment in building student teachers' professional literacy before, during and after the teaching practice. The findings were utilised in the process of creating an e-learning component aimed at preparing students to implement competence-oriented teaching.

The interviews yielded the following conclusions:

- More effective and faster development of school mentors is needed, and e-learning might respond to that need as course participants gain access to training materials at their own time and proceed with them at their own pace.
- The use of a modern Virtual Learning Environment makes multi-modal communication between mentors, student teachers and university supervisors feasible and efficient.
- Thanks to the application of self-study procedures the process of verifying and assessing trainees' work can be automated, organised and archived much more easily.
- The materials uploaded to a VLE can constitute examples of good practice for trainees during their practicum and a body of knowledge for mentors' methodology update.
- The e-learning platform should be a publishing space for projects, lesson scenarios, classroom tips for teachers and students.
- There is a need for safe teacher-friendly online spaces to organize collaborative work of students on common multi-disciplinary projects, and the use of an e-learning platform might satisfy this need.

In the second step of the present study, university supervisors were asked

about the role and place of e-learning in practical training. As for instructors' prior experiences with *Moodle* Learning Management System (known as Virtual Campus of Maria Curie-Skłodowska University), even though the system had been in use for seven years, the interviews showed very low prior use of Virtual Campus before the project (6 respondents as opposed to 19). Virtual Campus had been generally used for a short period of time (under 1 year, only 2 instructors used it longer than 2 years) and for few courses (the instructors ran up to 2 classes with the support of VC). 4 out of 25 instructors developed their own courses, 8 out of 25 developed authored digital materials, 2 out of 25 ran online courses with materials developed by others. Out of those who did teach with the online component, five instructors ran 100% face-to-face courses with supplementary materials online, and only one used online learner activities on VC.

Teaching practice supervisors reported generally high expectations towards the use of the virtual platform in teaching practice management. Overall, the respondents expected a significant role of the virtual platform in teaching practice management (15, as opposed to 6 "marginal" and 4 "don't know"), with the most preferred uses being communication of university supervisors and teacher trainees, communication of university supervisors and school mentors, on-going training of school mentors and sharing materials by student teachers. The least preferred uses, according to the respondents, were giving electronic feedback to student teachers by university supervisors, peer-assessment of materials uploaded by student teachers and authoring teaching materials by trainees on the platform.

The trainees' online workload should be between 2 and 4 hours per week, working with materials throughout the teaching practice 15 "before the TP", 16 "during the TP", 12 "after the TP"), with generally unlimited access also after the completion of the practicum (14 "unlimited", 2 "6 months after completing studies", 8 "only during the studies", 2 "only during the TP"). The respondents were relatively undecided about the role of student teachers and school mentors in the co-authoring of the e-Mentor virtual course, with a fourth being both in favour and against, and a half being undecided on the issue.

In terms of content, respondents proposed focusing to the greatest extent on the use of Computer-Mediated Communication tools (discussion forums with and without post assessment, blogs, wikis and journals) and assessment tools (quizzes and assignments). Low ranks for collaborative environments such as wikis or workshops might be attributed to lack of respondents' familiarity with these *Moodle* modules. When inquired which types of materials should

be included in the architecture of the e-Mentor virtual platform, instructors suggested a plethora of types of content: handouts, methodology materials, observation worksheets, links to audio and video materials, tests, lesson scenarios and sample activities.

4. IMPLICATIONS FOR THE FUTURE – TOWARDS INTEGRATION IN PRACTICAL TRAINING

The qualitative data collected from group interviews with teachers, prospective mentors and other teacher trainers allow the present authors to come up with some proposals on innovation in teaching practice implementation for better preparation of student teachers to work at schools. We believe that the solutions based on key competences as described above can lead to an integrative model of teacher education, which encompasses a series of actions executed collaboratively across curricula of studies, at the level of the Faculty of Humanities of MCSU, in order to raise the effectiveness of practical training of student teachers:

1. Integration and close collaboration of faculty involved in teacher training across institutes.

Collaboration of researchers dealing with similar fields of study, such as methodology, facilitates analysis of problems and discovery of innovative solutions. It is also an opportunity for collaborative 'learning in action', it develops interpersonal skills, stimulates discussion and exchange of experiences, enables researchers to put forward initiatives connected with the implementation of group projects. An example of such collaboration across the faculty is the 'www.praktyki.wh.umcs - Preparation and implementation of innovative teaching practice curriculum' project.

2. Modernising and updating teaching practice curricula.

Influenced by the theories of constructivism, action research, reflective practice and current educational frameworks in the EU (including key competences for lifelong learning), new curricula of practical training can bring about qualitative change in teacher education. See many interesting studies and reports on approaches to and systems of teacher education implemented in the countries of Western Europe, summarised for instance in Kwiatkowska, 1997; Kwiatkowska, Lewowicki, Dylak, 2000; Gołębniak, 1998, Fish, 1996; Klus-Stańska, 2000; Person, 1994; Giza, 1999.

3. Incorporation of Information and Communication Technologies, and specifically e-learning, into the process of organisation and management of

teaching practices alongside traditional forms of education.

See Myrdzik and Latoch-Zielińska, 2010, for a discussion of the need to revise methods of education and update teacher development strategies. As is believed by Myrdzik and Latoch-Zielińska, new methods of training should be based on project work and collaborative action with various forms of distance learning complementing face-to-face teacher training.

4. Wide-scale implementation of an e-learning platform used actively by both trainers and trainees to adapt the process of practical training and differentiate instruction to suit both pre- and in-service contexts.

5. Establishing contacts with educational institutions supporting university in its mission of teacher development, such as local authorities and other bodies running schools.

Such cooperation is a great way to increase the quality and effectiveness of collaboratively-taken actions, raises their prestige, enables better planning and co-ordination.

6. Establishing and strenghtening contacts with experienced mentors-teachers to elicit their mentoring experiences during group interviews.

7. Preparation of mentor training curricula and conducting blended mentor training sessions aiming at updating experienced teachers' knowledge and equipping them with observation and feedback-giving skills necessary for appropriate execution of their mentoring duties.

These mentor training courses allow teachers to raise their awareness of aims and functions of teaching practices as well as acquire the skills necessary to fulfill mentor duties as regards analysing and interpreting classroom experiences. Another aim of the courses is to expose teachers to effective blend of face-to-face and distance education, shape their positive attitudes towards e-learning and show examples of good practice of the effective combination of traditional and electronic ways of gathering knowledge.

8. Designing outlines of new curricula of theoretical and practical teacher training which would effectively integrate preparation of students within the fields of methodology, psycho-pedagogy and major fields of study.

These curricula should motivate students to self-development and training, encourage them to display empathy, responsibility, sophistication, sensitivity to classroom problems and propose constructive solutions to them. The idea behind this objective is the need to make theoretical preparation practical and coherent, applicable, multi-purposeful and essential (see Wantuch 2005; Kurczab 1993; Kosętka, Pietrzyk i Ślęczka, 2004, to name just a few).

It is important to overcome isolation and excessive specialisation of research disciplines, instead, promoting openness to the cross-curricular approach to teacher education.

9. Preparation of innovative instruments for use during teaching practices (among others, lesson observation worksheets, mentor assessment and trainee self-assessment schemes, etc.). These tools tailored to updated curricula would enable teacher trainees and their mentors to accomplish their duties in a reflective and creative way.

5. DEVELOPING COMPETENCE-SKILLED TEACHERS VIA COLLABORATIVE LEARNING – A PROPOSAL FOR AN ONLINE COMPONENT

The learning environment for the present study has been made in the dedicated Moodle platform (http://www.pwh.umcs.pl/) created as a part of the project. At the Project's Moodle, it is planned to set up dedicated courses entitled "Multi-disciplinary teaching" to introduce the idea of cross-curricular instruction, both in the "old" curriculum style (cross-curricular paths specified for each school level, clearly defined objectives and lesson topics) and in the "new" curriculum format (key competences for lifelong learning with their general definitions encompassing knowledge, skills and attitudes, however, without rigid ordering or topic listing).

Within the project, student teachers will be on the one hand exposed to materials for self-study, viewing and taking individual quizzes; however, on the other hand, an element of collaboration is intended to ensure a more durable impact of the presented ideas. The Moodle coursespace is going to contain the following resource types:

- sample YouTube-based videos and online lesson plans as input for group work analysis,
- discussion forums to enable reflection on viewing and reading materials,
- self-study quizzes consolidating factual methodology knowledge,
- private learning diaries encouraging individual reflection,
- collaborative topic-related glossaries.

At the same time, student teachers are going to be encouraged to collaborate with all other students from their faculty via thematic discussion forums,

glossary writing and authored materials posting. Finally, time and student motivation permitting, tandems of student teachers from different faculties (e.g, English studies and history or Polish studies and history) are going to be created for further collaborative work on authored lesson plans or teaching materials related to a particular subject (e.g., English, Polish or history) but exploiting the contents of a given key competence (e.g., communication in the mother tongue or cultural awareness and expression). However, for this kind of setup to be successfully implemented, a long-term engagement is needed, with a minimum horizon of 3 months for establishing contacts, organizing work, running the project, creating the final product and receiving feedback and evaluation.

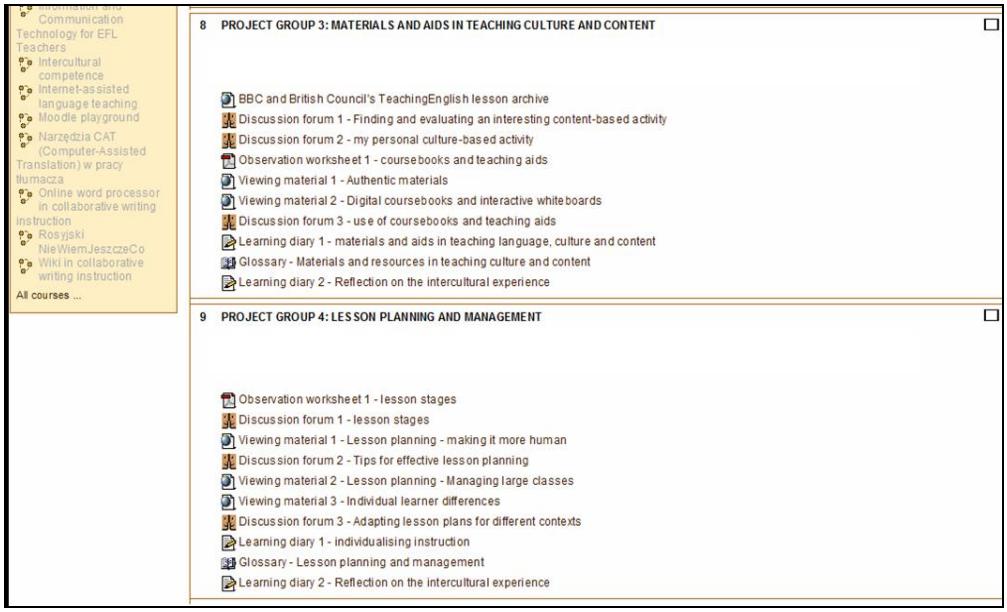

Figure 1. Sample Topics from the Teacher Training Online Component.

Source: http://lingwistyka.kampus.umcs.lublin.pl

CONCLUSION

The teacher training frameworks and solutions as discussed here, implemented on a wider scale in the 'www.praktyki.wh.umcs' project, attempt to address the general tendencies of reforming tertiary level institutions towards greater cross-curricular integration. When inspired by national and EU-wide educational policies, these may help redefine the ways theory is put into practice in the teacher development process.

As is indicated by the results of the present study, there is a need to relegate at least some part of the practical training to the e-learning mode. In our approach, e-learning is to be used for communication and collaboration of students individually and in project teams. Materials and tasks related to key competences for lifelong learning will help build student teachers' awareness of the characteristics of cross-curricular instruction and equip them with necessary skills to design and run such multi-disciplinary lessons during their practicum.

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FURTHER EDUCATION FOR INFORMATICS TEACHERS

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Abstract: *Further education for teachers is implemented in several forms in Slovakia. Qualifying study enables actual teachers to improve their qualifications in new subjects of education. Specializing study enables teachers to extend the scope of their work or to keep up-to-date with their field of education as regards both content and teaching methods. Implementation of National project of further education for primary and secondary school teachers in informatics at Constantine the Philosopher University in Nitra is reported in this paper. The target groups, aims, content of education, methods, and realization are discussed. Some examples of teachers' paperwork, which have been created during the project, and focus on developing key competences, are presented.*

Keywords: further teacher education, informatics.

INTRODUCTION

Informatics is a young subject in the system of school subjects at primary and secondary schools in Slovakia. Similarly to math, it develops pupils' thinking, their ability to analyze and synthetize, to generalize, to look for appropriate strategies of problem solving and to verify them in practice. It leads to precise expression of thoughts and their recording in formal notations. It teaches to use a computer and digital technologies in a meaningful and effective manner in everyday life in information society.

In 2008 a school reform which included also strengthening of informatics teaching in primary and secondary education was introduced into practice. Thus, it replies to a process of society informatization and dissemination of digital technologies into all parts of life. Dissemination of informatics

teaching results in the need of the increased number of qualified informatics teachers and of their continuing lifelong learning.

1. TEACHING OF INFORMATICS IN SLOVAKIA

Objectives and content of informatics as a school subject have been developing gradually. P. Micheuz (2005) describes twenty years of informatics teaching at secondary schools in Austria. He identifies four periods:

1975-1985 – teaching was dominated by programming in Basic programming language. Computers did not have an operating system, hard disk, floppy disk, and programming was the only thing which could be done during lessons.

1985-1990 – the first personal computers with a disk operating system and applications for word and spreadsheet processing (word and spreadsheet processor) appeared. Teaching was experimental. Teachers did not have or had very little experience with using of personal computers. Informatics was taught only by teachers who participated in a training lasting a couple of days.

1990-1995 – graphical user environments simplified work with a computer, brought computers closer to non-informaticians and started a period of integration of computers also into other school subjects.

1995-2000 – the use of computers expands to all parts of life; internet as a source of easily accessible information appears on the stage.

2000 – 2005 – informatics is shaping as a school subject; standards are defined, didactics of informatics is developing; informatics teachers are trained at universities.

Informatics teaching had similar development in Slovakia. A certain time shift can be noted due to later introduction of some technologies but this handicap was eliminated during several years after the revolution in 1989.

V. Dagiene (2005) draws attention to another aspect in the development of introducing informatics and information technologies into general education. In the countries of Eastern Europe, to which we belong as well and which have the tradition of education of academic type, informatics is from the beginning formed as a separate subject whose development passed from teaching of programming and a computer theory through practicing skills related to work with computer and computer applications to development of

competences in using information technologies and understanding their principles. In some countries of Western Europe with less centralized school systems a different tendency can be observed: computer technologies are implemented into all subjects and informatics as a separate school subject does not exist or integrated teaching without separating individual school subjects is applied.

Current objectives of teaching of informatics as a general education subject in Slovakia are based on short history of informatics teaching and they reply to technological and educational trends. The aim of informatics teaching is so that a pupil:

- acquires competences in the field of information and communication technologies use and is digitally literate,
- understands fundamental principles of automated information processing.

It is necessary to obtain these objectives not only by teaching informatics as a school subject, but also by common acting of informatics as a school subject and by applying digital technologies in teaching of other school subjects, in intersubject projects and in school management.

Based on objectives of informatics teaching, education content of the subject in primary and secondary education is divided into 5 themes:

1. Information around us,
2. Communication by means of ICT,
3. Procedures, problem solving, algorithmic thinking,
4. Principles of ICT functioning,
5. Information society.

More detailed objectives and education content in these five themes are defined by standards for individual levels of education (ISCED1, ISCED2, ISCED3 according to UNESCO international classification) in the State Program of Education.

The number of mandatory lessons of informatics teaching per week in each year is shown in Table 1. A school complements the State Program of Education by facultative content which takes into consideration regional conditions and specific needs and possibilities of a school. Thus, informatics teaching can be, in the education program of a school, complemented by additional lessons according to orientation of a school.

Table 1.

The number of informatics lessons per week

	ISCED1				ISCED2					ISCED3			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
until 2008	-	-	-	-	-	-	-	-	-	2	-	-	-
since 2008	-	1	1	1	0.5	0.5	0.5	0.5	0.5	1	1	1	-

Source: http://www.minedu.sk/index.php?lang=sk&rootId=2319

After the reform in 2008, the increased number of mandatory lessons of informatics teaching on all levels of education, which can be seen in Table 1, increases demand for qualified teachers of informatics, especially in primary and lower secondary level of education.

2. CONTINUING EDUCATION FOR TEACHERS

The process of teacher preparation includes several phases (Schwille et al. 2007). It begins with the phase of *observation* during the teachers' own schooling experience. The next phase is the formal institutional *pre-service teacher education*. Beginning teachers adapt to their roles as teachers during *induction* phase. The learning process of practising teachers continues to the end of their teaching career. This is the phase of *continuing professional development*.

A particularity of education for informatics teachers is that some of these phases are absent in the preparation of a teacher. Informatics teachers at primary schools did not have experience with observation of teacher's work in the role of a pupil. Many of them do not have formal university education in the field "Informatics Teaching". For this reason, a substantial part of preparation takes place during a period of active teacher career.

In the Slovak system of continuing education, there are several kinds of in-service education for practicing teachers:

- *adaptation study* is intended for beginning teachers who are obtaining first experience in teaching under supervision of an experienced teacher (mentor),
- *actualization* and *innovation study* is intended for qualified teachers in order to maintain or improve professional competences necessary for standard performance of educational activity,

- *specialization study* is oriented on acquiring of new professional competences necessary for performance of special non-standard educational activities, i. e. to introduce beginning teachers into practice, to participate in preparation of a school education program, to prepare concepts, plans, projects in the framework of a given school subject, as well as in cooperation with teachers of other subjects,
- *qualification study* is aimed for teachers who want to obtain qualification for teaching of the other school subject,
- *functional study* is aimed for obtaining competences necessary for performance of managerial function in a school.

Non-formal learning plays an important role in lifelong learning of an informatics teacher as well. An informatics teacher improves his professionality by technical literature study, participation in conferences related to informatics teaching, participation in workshops, technical lectures, presentations and expositions. Teachers share their experience in professional clubs (Šnajder et al. 2006), they create professional social networks on internet portals for teachers on which they share their teaching materials, they express their opinions in blogs, they discuss.

However, non-formal learning cannot resolve the problem of the lack of qualified informatics teachers. Non-formal learning is based on voluntariness and on strong intrinsic motivation to learn. In contrast, extrinsic motivation is weak because acquired knowledge is not formally recognised by a school institution.

2.1 National project of further education for primary and secondary school teachers in informatics

A problem of the lack of qualified teachers can be systematically resolved by a formally accredited study. For this purpose, National project of further education for primary and secondary school teachers in informatics financed from European structural funds was prepared. An investigator of the project is National Institute for Education. The realization of the project started in October 2008 with the duration of 36 months. A strategic objective of the project is to design and realize modern further education for informatics teachers in primary and secondary education supported by digital technologies. Specific objectives of the project are:

1. to prepare accredited study programs and to realize education for 1500 teachers.

2. to equip participants in education with digital technologies needed for their effective education which they can further use in a teaching process.

Education was realized at five Slovak universities which prepare future informatics teachers: Comenius University in Bratislava, Pavol Jozef Šafárik University in Košice, University of Žilina, Matej Bel University in Banská Bystrica, and Constantine the Philosopher University in Nitra. Under the supervision of the main expert supervisor of the project prof. Ivan Kalaš from Comenius University in Bratislava a concept of three study programs for three target groups of teachers was created:

1. specialization study for teachers in primary education,
2. qualification study for teachers in lower and higher secondary education without qualification for informatics teaching,
3. specialization study for qualified informatics teachers in lower and higher secondary education.

All three study programs have a common basic content structure which pursues four content lines:

1. digital literacy of a teacher – represents the summary of knowledge and skills for productive, creative and safe use of digital technologies in ensuring professional and personal needs of a teacher,
2. modern school – the objective of education in this line is to examine an influence of digital technologies on a society, school and cognitive process and to present a vision of a modern school which uses digital technologies for development of key competences of pupils,
3. informatics – is a hardcore of a training for an informatics teacher adapted to needs of individual target groups of participants in education,
4. didactics of informatics – the objective of education in this line is to get familiar with objectives, content and methodology of informatics teaching.

Proportional representation of thematic lines in study programs for individual target groups is based on the needs of participants in education (Figure 1). A hardcore of all study programs is informatics. Indeed, content is different for teachers of individual target groups and in this line there are also biggest differences in content. A line "digital literacy" is the most present in education for the 1st target group (teachers in primary education) where there is probably the lowest level of digital literacy. A line "modern school" got bigger percentage space in specialization study programs for the 1st and the

3rd target group; in a qualification study program the emphasis is put more on technical informatics education. Didactics of informatics has more or less the same proportional representation in all three target groups and it represents around one fourth of the total volume of education.

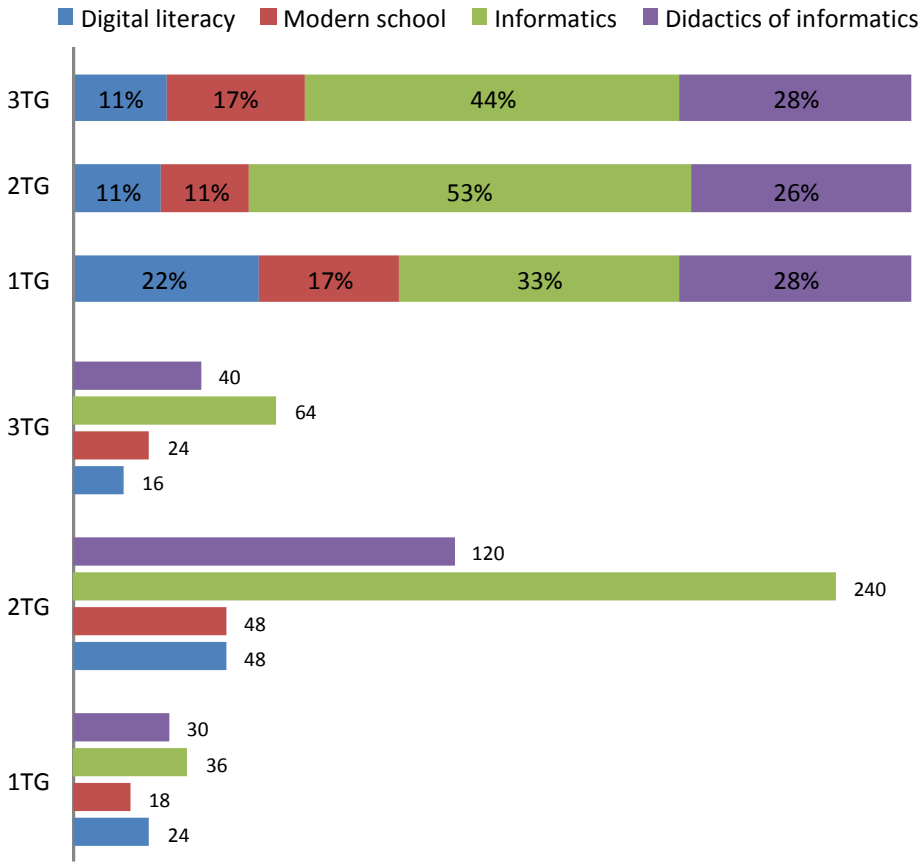

Figure 1. Representation of content lines in education in three target groups (TG): percentage and number of lessons

Source: http://dvui.ccv.upjs.sk/

2.2 Realization of the project

A strategic objective of the project was to provide education for 1500 informatics teachers from all parts of Slovakia. Education was running at five universities for two years from June 2009 to June 2011. The same number of teachers completed further education in the second year of project duration.

New qualification for informatics teaching was obtained by 200 teachers in a two-year qualification study (the 2nd target group).

Proper education was preceded by preparation of study programs, preparation of study materials and e-learning education environment and by training of lecturers. Preparation of study materials created space for unique cooperation and exchange of experience between professionals from five universities and teachers from practice. A series of 100 textbooks and some original teaching software were created.

2.3 Final paperwork of participants in education

Education for teachers in all groups was completed by elaboration of final paperwork under supervision of an experienced lecturer, by its presentation and technical discussion about the subject of study. Many participants in education demonstrated in their final paperworks, in addition to professional knowledge and pedagogical experience, also a high level of creativity. In their paperworks they prepared original methodology materials for teachers and learning materials for pupils, they created didactic software applications, prepared and realized interesting projects with pupils, experimented with unconventional teaching methods, prepared e-learning courses, realized surveys among teachers, parents and pupils and they carried out action research in classes.

A lot of creative teachers could be found among participants in education in the 1st target group. Most of them did not have any experience because informatics on a primary level of education was a new subject. Until 2008 it was taught only experimentally at selected schools. Maybe this was the reason why they were more interested in education and their paperworks were original. In spite of the fact that these teachers are not professionals in informatics, they could prepare simple software applications for practicing basic computer skills, such as work with the mouse, or for developing abstract and algorithmic thinking of pupils.

In Figure 2 there is an example from a series of electronic working sheets for practicing mouse clicking (Pinterová 2010). A pupil has to gradually click on cards with numbers from the lowest number to the highest number. Working sheets were created in an Imagine Logo programming environment.

For teachers in primary education without programming skills the environment called Cards (Kartičky) was created (author P. Tomcsányi), in which teachers learnt to create electronic working sheets with matching and sorting activities for pupils in an interactive way (Tomcsányiová et al. 2009, 2010). In Figure 3 there is an example from the final paperwork of

Andrejkovics (2010). The task is to place pictures into empty boxes in the correct order. The program can mix movable cards and check the correct answer. The task develops, in addition to basic computer skills, logical thinking of children.

Figure 2. Practicing of mouse clicking

Source: Pinterová, 2010 (consultant Lovászová)

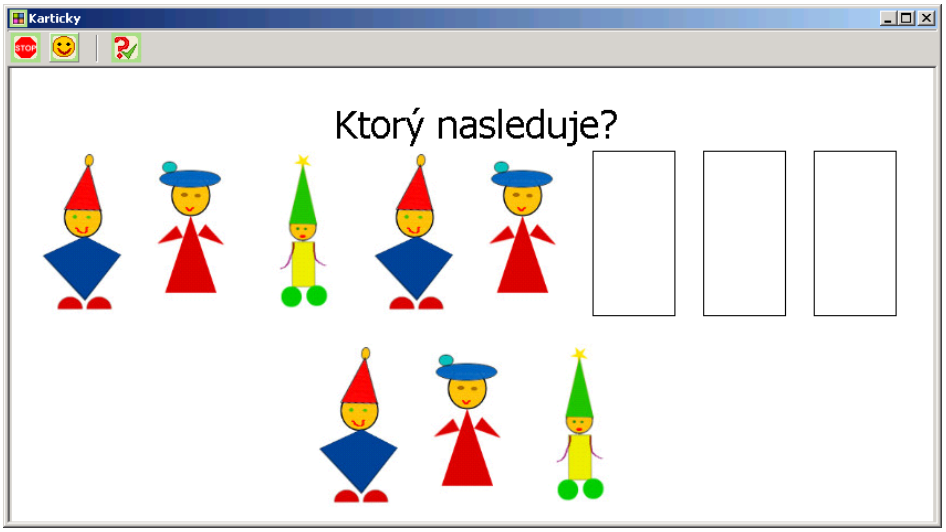

Figure 3. Putting in order according to rules

Source: Andrejkovics, 2010 (consltant Lovászová)

Teachers created working sheets also by using standard office software. In Figure 4 there is an example from a paperwork of Andrejkovics (2010). The aim of a working sheet created in a spreadsheet is to practice typewriting on a keyboard. Motivation is to create cards for a cardplay for kids named Quartet (Kvarteto). The activity develops logical thinking: categorizing of things, creating of permutations. The activity is destinated to pupils in schools with Hungarian language as a teaching language. The activity develops vocabulary in a mother tongue (Hungarian), in a state language (Slovak) and in foreign languages (German, English). After resolving a task, cards are printed and cut and children play according to well-known rules.

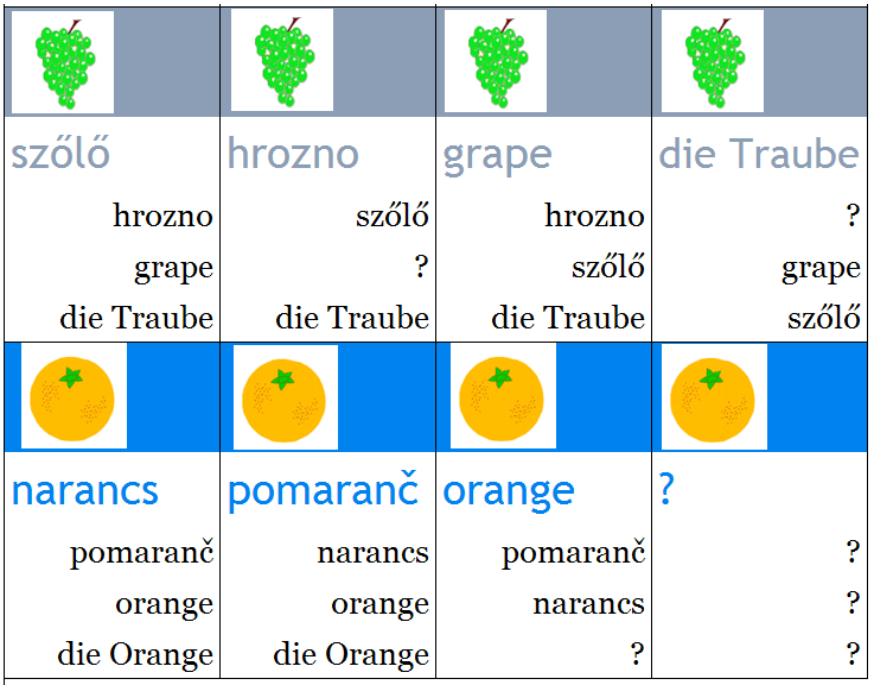

Figure 4. Practicing of typewriting and categorization

Source: Andrejkovics, 2010 (consultant Lovászová)

Implementation of multicultural education can be found in a paperwork of Práznovská (2011). In Figure 5 we can see the result of drawing in a graphics editor. The task of pupils was to draw couples of smileys of different skin colour smiling on each other and to express a certain relationship by this drawing (friendship, love, help).

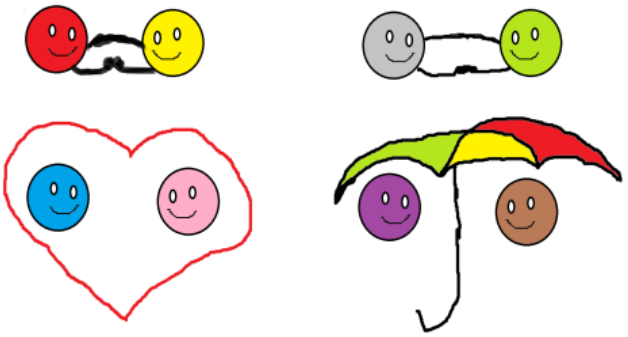

Figure 5. Drawing in a graphics editor and multicultural education

Source: Práznovská, 2011 (consultant Palmárová)

In their paperworks teachers also presented their experience with unconventional forms of teaching. In a paperwork of Detková (2011) there are suggestions for integrated thematic teaching. Once a month teaching is not divided into lessons and subjects but it is realized in integrated blocks. An integrating element of teaching is a common theme by which all activities of the day are motivated. In Figure 6 there is an example of the result of drawing in a graphics editor in the framework of the thematic day called "Point Friday". Pupils drew a picture of an animal and its beginning letter by means of a dotted technique.

Printed study materials for participants in education were supported also by e-learning courses in which participants found all materials necessary for studying by means of which they submitted assignments of tasks and communicated with lecturers also on distance. This way of teaching inspired some teachers to create their own e-course for their pupils.

Figure 6. Integrated thematic teaching with a key notion "point"

Source: Detková, 2011 (consultant Lovászová)

A nice example is a course of programming in Imagine Logo environment for pupils of the 7th year of a primary school (Antalík 2011). A course contains teaching materials of various types (teaching texts, video tutorials, model solutions of tasks, and links to interesting websites) and various activities (programming assignment, submission of a solution, an analysis of a program, a discussion forum, a test).

However, the principal contribution of the paperwork is not a created e-course of programming but results of action research which the author carried out with pupils in a class. The author in his paperwork records and analyzes his experience, he reflects on created problems, he looks for explanations for them and he suggests measures for their elimination. He observes and analyzes their efficiency during further lessons.

A very interesting result of this miniresearch is a finding that work with e-course significantly encouraged development of pupils' competences necessary for effective learning. Pupils worked with written assignments and textual instructions, which required reading comprehension. The author resolved the problems with reading and text comprehension by video tutorials. When working in an e-course, pupils were more motivated to work, think and communicate actively about problems with a teacher and schoolmates. By means of a discussion forum pupils learnt to cooperate in task solving. Cooperation in a small community of participants in a school e-course is good experience for future participation in broader internet communities.

CONCLUSION

The project of further education for primary and secondary school teachers in informatics is currently in its final phase of evaluation of the project results. At Constantine the Philopher University in Nitra education was provided by Informatics Department. Education in Nitra was completed by teachers from Nitra and Trnava regions: 160 teachers in the 1st target group, 42 teachers in the 2nd target group and 120 teachers in the 3rd target group. Teaching was provided by 17 lecturers.

The National project of further education for primary and secondary school teachers in informatics can be considered as a pilot project. According to three created study programs continuing education for informatics teachers at workplaces with accreditation can run also in the future. A unique set of study materials, which was created in the framework of the project, is a high

quality study literature for practicing informatics teachers as well as for future informatics teachers.

Participation in the project was a contribution not only for studying teachers, but also for their lecturers. Lecturers from five universities had the opportunity to confront their teaching procedures, to be inspired by their colleagues' works, to cooperate in creation of common education modules and study materials. Lecturers found inspiring also discussions with creative teachers from practice and cooperation in their final projects.

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PROPRIETARY THEORETICAL AND METHODOLOGICAL COMPUTER-ORIENTED SYSTEM FOR THE DEVELOPMENT OF MATHEMATICAL COMPETENCE OF STUDENTS

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Abstract: *The article is devoted to the use in teaching mathematics of a proprietary, theoretical and methodological computer-oriented system for the development of mathematical competence of students. The relevance of the research is related to the existing contradiction between the importance of acquiring key competencies by students, including mathematical competence, and the actual relatively low level of these competencies. In the European framework, mathematical competence is defined as a combination of knowledge, skills and attitudes appropriate to the situation. Mathematical competence is also set out in the Polish and Czech requirement standards. At the same time e-learning, which today is no longer considered as a fashionable modern trend, but as an effective, modern form, method, technology of teaching - learning proves its utility not only in high school and also at lower levels of education - secondary school, for example, in preparing students for the final secondary school examination in mathematics and in developing students' key competencies, including mathematical competence.*

Keywords: key competences, mathematical competences, e-learning, information and communication technology in education, computer program, distance learning system.

INTRODUCTION

The contemporary education process, which is aimed at, among other things, establishing an interaction enhancing relationships between the participants and ensuring the adaptation of students to modern social and economic conditions, to personal fulfilment and development of the creative potential of a particular person, requires the development of innovative educational technologies, including extensive use of contemporary information and communication technologies for personal and professional development. Currently, the focus of all stakeholders of the educational process is the identity of the learner. More and more emphasis is being laid on the need and necessity of development and improvement of individual creative and intellectual abilities and on, the shaping and strengthening of competences.

Standard professional background, especially in the areas of advanced technology may be not sufficient anymore, which makes it necessary to use new techniques and technologies of teaching, especially in sciences directly related to IT.

Rapid obsolescence of information and knowledge gained by employees, occurring during the very process of training makes it necessary for information and knowledge to be constantly updated and improved.

Research work in the field of efficient use of new information technologies in teaching mathematics in high school was carried out by H. Kakol, A. Nowak, A. Rybak, B. Pabich, E. Smyrnova-Trybulska, J. Vaníček.

Analysis of informatization of education and the related processes was performed by S. Juszczyk, J. Kapounová, K. Kostolanýová, E. Smyrnova-Trybulska, J. Šarmanová.

Prospects for development of the use of contemporary teaching methods, with particular emphasis on remote teaching were presented by S. Brown, B. Johnston, A. Reis, E. Smyrnova-Trybulska, others. Psychological and pedagogical aspects of distance education were discussed by L. Briggs, J. Cowan, S. Juszczyk, D. Peal & B. Wilson, G. Seamens, I. Stuchliková, others. Studies into the development of key competencies were carried out by S. Juszczyk, T. Huk, W. Furmanek, M.M.Sysło, others.

One of the next stages in the development of computer-assisted instruction is to develop a proprietary theoretical and methodological computer-oriented system for the development of mathematical competence of students with the use of selected computer programs and distance education, preparing the learner for the final secondary school examination in mathematics.

In the well-known document, adopted in 2006 by the European Parliament (Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning. (2006/962/EC). The European Parliament and the Council of the European Union, 2006, eight key competences are defined that are needed by every person for self-realization and personal development, for being an active citizen and for achieving full social integration and employment. Competences are defined as a combination of knowledge, skills and attitudes appropriate to the situation. Key competences are those which all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment. The following key competencies have been established:

1. Communication in the mother tongue,
2. Communication in foreign languages,
3. **Mathematical competence and basic competences in science and technology,**
4. Digital competence,
5. Learning to learn,
6. Social and civic competences,
7. Sense of initiative and entrepreneurship,
8. Cultural awareness and expression.

Mathematical competences are ranked third among the key competencies - **"Mathematical competences and basic competences in science and technology".**

To determine the range of mathematical competences, one needs to specify what they are and who they are particularly relevant to in the teaching and learning process.

According to W.Kopaliński, "**competence** is a property, range of powers (...), the scope of one's knowledge, skills, responsibility (...)"(Kopaliński 1967: 201)

On the other hand, a **competent person** is, in other words "authorized, empowered to act, to issue a decision, having the qualifications to express judgments and evaluations (.)" (Skorupka, Auderska, Łempicka 1969).

Mathematical competence is very precisely defined by Mogens Niss (Niss 2001). He has identified **eight elements of mathematical competence.** *He defined* it as "the ability to understand, judge, do, and use mathematics in a

variety of intra- and extra-mathematical contexts. Necessary, but certainly not sufficient, prerequisites for mathematical competence are extensive factual knowledge and technical skills. (...). Mathematical competence includes two overarching sorts of capabilities. The first is to ask and answer questions about, within, and by means of mathematics. The second consists of understanding and using mathematical language and tools." (Niss 2001). *He has identified following eight competencies:*

- Thinking mathematically (mastering mathematical modes of thought);
- Posing and solving mathematical problems;
- Modelling mathematically (i.e., analyzing and building models);
- Reasoning mathematically;
- Representing mathematical entities;
- Handling mathematical symbols and formalisms,
- Communicating in, with, and about mathematics;
- Making use of aids and tools (including information technology),

Mathematical competence, defined in the document **"Key Competences for Lifelong Learning - A European Reference Framework "(MKKE)** are defined as a combination of knowledge, skills and attitudes appropriate to the situation. (European Parliament legislative resolution on the proposal for a recommendation of the European Parliament and of the Council on key competences for lifelong learning)

Knowledge:

- W1. understanding of mathematical terms and concepts;
- W2. well controlled numeracy;
- W3. knowledge of measures and structures;
- W4. knowledge of basic operations and basic mathematical presentations;
- W5. awareness of the questions to which mathematics can offer answers.

Skills:

- U1. apply the key principles and processes of mathematics in everyday situations at home and work (in a mathematical way to reason);
- U2. monitor and evaluate the arguments strings (understand mathematical proof);
- U3. transmit messages using mathematical language;
- U4. use of mathematical text.

Attitudes:

- P1. show respect for the truth;
- P2. strive to search for causes;
- P3. evaluate the validity of inferences and actions.

One of the most popular programs for testing competencies in the classroom is the PISA. It is the Programme for International Student Assessment, conducted under the auspices of the Organization for Economic Cooperation and Development - OECD. The results of PISA tests enable us to compare the achievement of students from different countries. The program is designed to test knowledge and skills of fifteen-year old students. The knowledge and skills are tested for:

- understanding texts (reading comprehension);
- mathematical thinking (mathematics);
- scientific thinking (reasoning in the natural sciences).

In 2003, efforts were focused on testing mathematics.

Table 1.

Percentage distribution of students from Poland and the Czech Republic on different levels of math skills.

Level	Poland		Czech Republic	
	Number of students	Percentage	Number of students	Percentage
Level 6	108	2%	496	5%
Level 5	432	8%	1289	13%

Level 4	972	18%	2083	21%
Level 3	1350	25%	2381	24%
Level 2	1350	25%	1984	20%
Level 1	810	15%	1190	12%
Below the level of 1	379	7%	496	5%
Total:	5401	100%	9919	100%

Source: PISA 2003 survey in Poland and the Czech Republic.

An analysis of the results of the table yields the conclusion that the students attained better results in the Czech Republic. 1785 (18%) of pupils achieved level 5 and 6 results, while in Poland approximately 540 (10%) of pupils achieved the results of these two levels. 379 (7% of) Polish students and 496 Czech students (5%) achieved below level 1. These students were not able to solve the simplest of problems.

Selected mathematical competences have been included in new Polish and Czech standards of examination requirements for the final secondary school examination in mathematics.

According to **Polish standards of examination requirements in mathematics (**Rozporządzenie Ministra Edukacji Narodowej z dnia 28 sierpnia 2007 r. zmieniające rozporządzenie w sprawie standardów wymagań będących podstawą przeprowadzania sprawdzianów i egzaminów (DzU Nr 157, poz. 1102), the candidate has skills enabling her / him:

- to use and create information;
- to use and interpret the representation;
- to use mathematical modelling;
- to use and development strategies;
- to reason and to present arguments.

1. LATEST DATA (2009) RELATING THE USE OF ICT IN EDUCATION AND E-LEARNING BY POLISH STUDENTS AND TEACHERS OF MATHEMATICS IN SILESIA

The survey was conducted in 2009 by Mgr A. Heba as part of her doctoral thesis research. A total of 500 teachers and 500 secondary school students were interviewed in Poland, in the Silesia province. Questions can be divided

into groups by type of information they provide. Initial questions in the questionnaire provided general information about the respondents, in the case of teachers the information related to: gender, age, type of completed education, work experience, employer, and the way computer skills were acquired. Information about students included: gender, age, type of school attended. Another question concerned the use of contemporary Information and Communication Technology (ICT) in education. Next, respondents were asked what educational multimedia programs were being used in their math classes. Respondents were allowed to select multiple answers. Some results of the surveys were published in several articles of the author (Heba 2009a, 2009b)

1.1 Key findings from the survey

1. Cabri, graphing calculators, Gran, Geogebra are the most popular programs that teachers and students use during math classes.

2. When asked to assess themselves, the teachers and young people thought that they had very well mastered the ins and outs of working with the computer. It can be argued that the students are formally prepared, have an appropriate level of competence in computer skills and use of computer programs and multimedia educational programs in mathematics.

3. However, a large discrepancy occurs between the level of competence in both students and teachers in the computer and the use of computer programs and e-learning.

4. According to the teachers and students, most schools do not use Moodle in teaching.

Comparing both groups of respondents it can be concluded that among the respondents familiar with Moodle, more teachers than students have the skills to use the platform.

This is due to the fact that teachers attend various postgraduate studies and training courses in information technology and use the platform in their work as examiners on regional school-leaving examination boards.

5. Teachers pointed **to the lack of pre-prepared courses in mathematics.**

Due to the absence of ready-made teaching materials on such platforms, the teachers are reluctant to use this tool because it would involve the preparation of lessons and activities, which they consider to be very labour intensive and time consuming.

It is worth noting that the teachers were very keen to use this platform provided that there were pre-prepared courses and classes which they could use during lessons or for homework assignments.

It was pointed out that there was a mismatch between the level of available exercises and math problems on this type of platforms and the level of the school-leaving examination (basic or extended).

2. RESEARCH PROBLEM

After examining the documents, literature, current research we identified a problem concerning the conflict between the importance and priority of of students' possessing key competencies, including mathematical competence and the actual level, which is not that high.

3. GENERAL RESEARCH PURPOSE

After analyzing the literature as well as national and foreign experience in the development of mathematical competence and e-learning, the general objective was formulated: to examine what effect, and to what extent, a proprietary, scientifically sound, methodological theoretical computer-oriented system for the development of mathematical competence of students (e-learning course, a methodological guide for teacher, teaching materials for students, developed goals, form, content, method), using the distance learning platform, based on CLMS Moodle system with the use of selected computer programs, has on students' preparation for the compulsory final secondary school examination in mathematics.

4. RESEARCH TASKS

1. *Development of a proprietary theoretical and methodological computer-oriented system for the development of mathematical competence of students, including:*

- developing educational requirements for the distance teaching of mathematics to students;
- the development of theoretical and methodological requirements for the distance teaching of mathematics to students;
- development of study materials for students;

- develop a guide for teachers;
- development of a distance mathematical course preparing students for the final secondary school examination in mathematics, and developing mathematical competence of students, using selected computer programs;
- development of organizational details of the course curriculum using a distance course.

2. Conducting teaching experiments to verify the effectiveness of the proposed methodology.

5. MAIN HYPOTHESES AND SPECIFIC HYPOTHESES

5.1 Main Hypothesis

H1 – Proprietary, scientifically sound, theoretical-methodological system for computer-oriented development of mathematical competence of students using a distance learning platform and selected computer programs contributes to a higher level of mathematical competence of selected students and improves their results obtained during the compulsory final secondary school examination in mathematics.

5.2. Specific Hypotheses

H1.1 - Proprietary scientifically sound theoretical-methodological computer-oriented system for the development of mathematical competence of students using a distance learning platform and selected computer programs contributes to a higher level of mathematical competence in the use and development of information and their results, obtained during the compulsory final secondary school examination in mathematics in respect of this competence.

H1.2 - Proprietary scientifically sound theoretical-methodological computer-oriented system for the development of mathematical competence of students using a distance learning platform and selected computer programs contributes to a higher methodological level of mathematical competence in the use and interpretation and representation of their results, obtained during the compulsory final secondary school examination in mathematics in respect of this competence.

H1.3 - Proprietary scientifically sound theoretical-methodological computer-oriented system for the development of mathematical competence of students using a distance learning platform and selected computer programs

contributes to a higher level of mathematical competence in the field of mathematical modelling and their results, obtained during the compulsory final secondary school examination in mathematics in respect of this competence.

6. RESEARCH STAGES

The course of the research.

The research Plan contained a combination of quantitative and qualitative methods and included three phases.

6.1. Analytical - ascertaining phase (2008-2009)

An analysis was carried out of research methodological literature concerning teaching methods and psycho-pedagogical literature related to teaching mathematics, including the remote mode as well as available experience in the field of distance education in Poland and abroad.

On 05-09 October 2009, a new extended survey was conducted among mathematics teachers in the Province of Silesia. Overall, 500 teachers were surveyed. The tests were conducted during a conference on the preparation of teachers for the new formula of the compulsory final secondary school examination in mathematics.

In the period 20 October - 20 December 2009 a similar survey was carried out among 500 students in the province of Silesia.

6.2. Search Phase (2009-2011)

The objective during the search phase was to identify ways to improve the curricula and to develop of the concept of remote courses in mathematics in order to improve the quality of education for high school students.

At this stage, an e-learning course was developed, teaching methods were put forward together with guidelines for the course teacher, and the organizational framework of the course was developed, too.

At the next stage the course was approved and implemented and the effectiveness of proposed solutions was verified.

6.3. Formative and generalizing phase (2011)

a) Quantitative section

The e-learning course was run from mid-February 2011 to the end of May 2011.

At the beginning, pre-test surveys were carried out, (pre-check the quantity and quality of information in the area of individual mathematical competences).

After the course, a test was conducted to check the knowledge. The test focused on the same area of knowledge, the same issues, and comprised the same questions.

Next, using statistical methods, verification was carried out of the hypotheses claiming that a newly developed course in mathematics with the use of selected computer programs increases the level of mathematical competence of students.

b) Quality section

After the experiment is conducted, quality tests will be carried out using qualitative research interviews with selected nine students from the experimental group.

7. ON THE RESEARCH CONCEPT

The concept of research and the structure of the system for developing mathematical competences as well as the relationships between system components are shown in Figures 1 and Figures 2

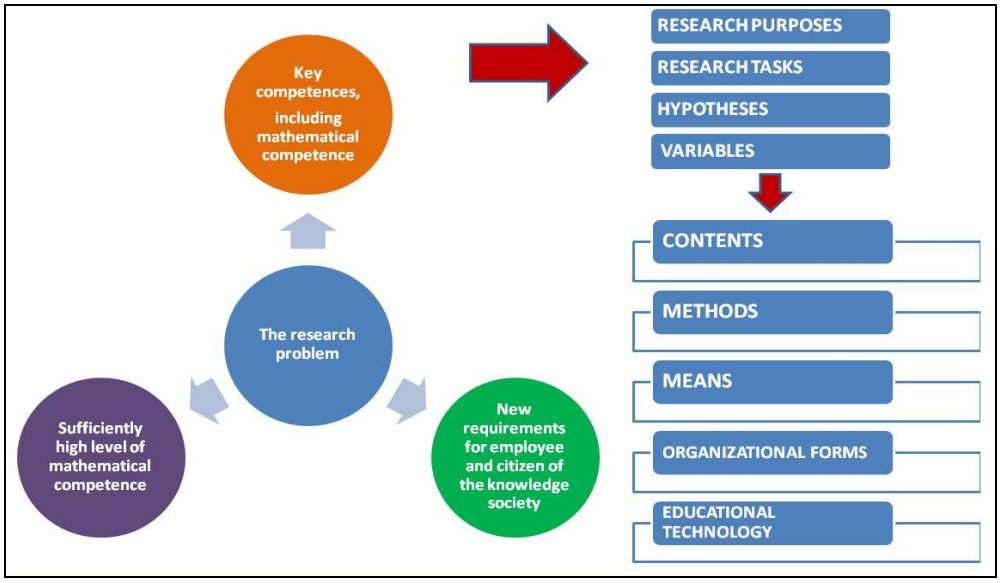

Figure 1. The concept of research.

Source: own

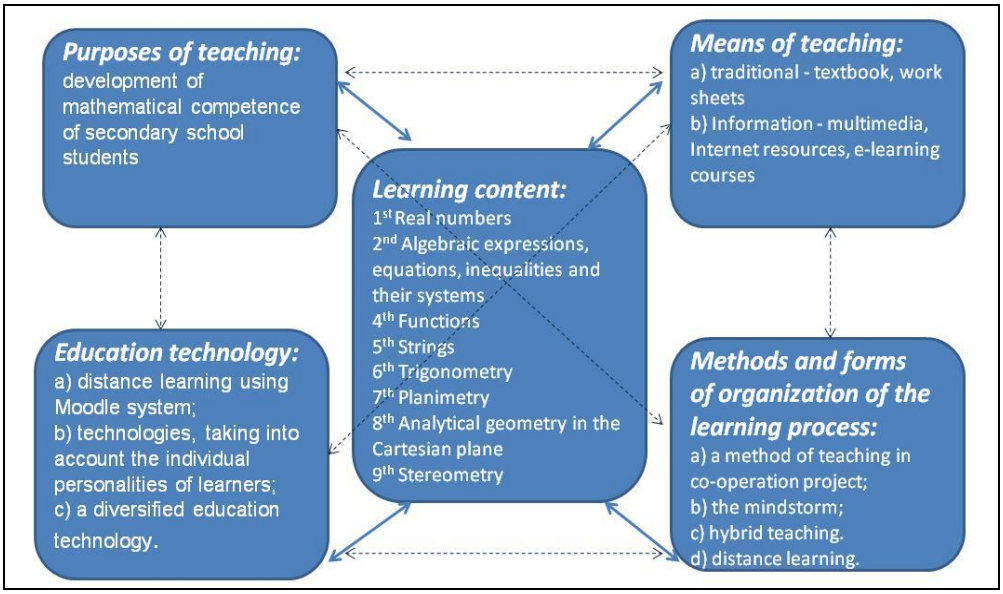

Figure 2. Relationships between components of a system for the development of mathematical competences.

Source: own

8. DESCRIPTION OF A SELECTED MATHEMATICAL COMPETENCE IN USING AND CREATING INFORMATION AND ITS CONNECTION WITH ACTIVITY, TYPES OF EDUCATIONAL MATERIALS, COMPUTER PROGRAMS, THEMATIC SCOPES, AND THEORY OF TEACHING AND MENTAL OPERATIONS

One of the major components of a proprietary, scientifically sound theoretical-methodological computer-oriented system for the development of mathematical competence of students is a **methodological guide for the teacher**, which contains sample lesson plans detailing learning objectives, learning content, teaching technologies, methods and organizational forms of learning process based on the use of the e-learning course, and selected computer programs. The system also provides a detailed description of the developed remote mathematical course preparing for the final secondary school examination in mathematics and developing mathematical competence of students, using some computer programs.

The e-learning course preparing for the final secondary school examination in mathematics was available on the e-learning platform of the Faculty of

Ethnology and Education Sciences University in Cieszyn Silesia in Katowice (http://el2.us.edu.pl/weinoe) (Figure 3, 4, 5, 6). The e-learning course comprised 30 hours of instruction in the traditional mode and 60 in the remote mode.

The course has a modular hierarchical structure and consists of several standard blocks:

- **Introduction to distance course:** Course description, Literature, Glossary, Forum, Registration Survey;
- **Thematic Module:** Pre-Test (diagnostic test); basic teaching materials in the field in question (presentations, text files, videos, etc..). Block of tasks, check, knowledge testing (educational testing). Creative Task Pad, interactive communication block for the lecturer and the students and the students among themselves; Additional resources relating to the learning field in question; knowledge testing (control tests).
- **Module Summary:** Test, Final survey, Reflection survey (evaluation).

I. The topics of the thematic course modules:

1st Real numbers.

2nd Algebraic expressions, equations, inequalities and their systems.

3rd Functions.

4th Strings.

5th The geometry of the Cartesian plane.

6th Planimetry, stereometry.

7th Elements of descriptive statistics. Probability theory and combinatorics.

8th Sets of mathematical problems from the final secondary school examination in mathematics in previous years.

9th Computer programs used in the e-learning course.

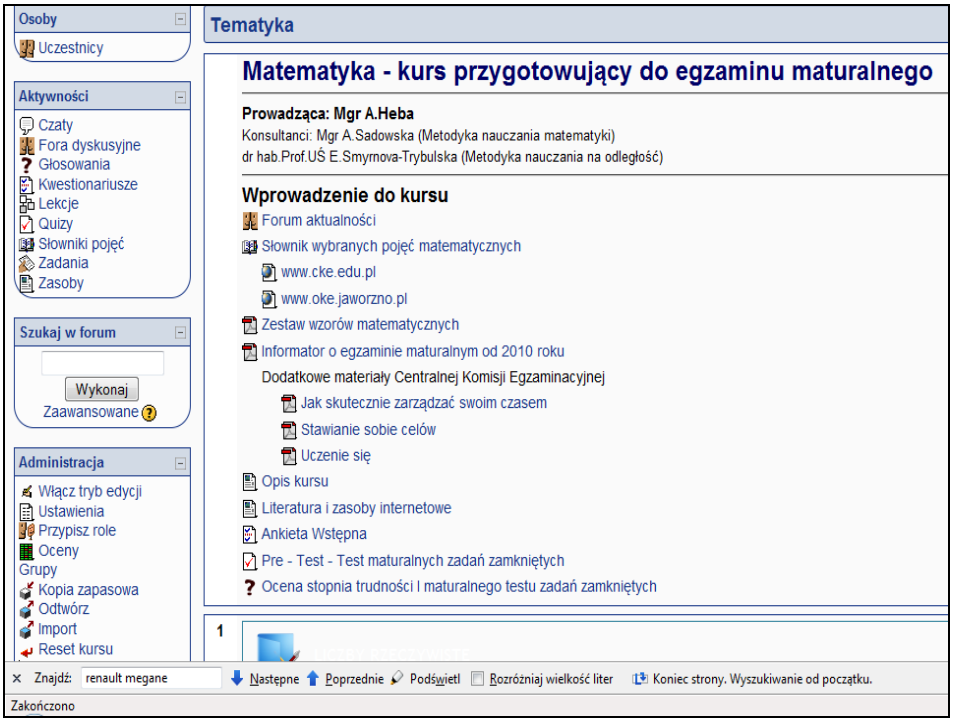

Figure 3. Section of e-learning course. Introduction to the distance course. *Source: http://el2.us.edu.pl/weinoe*

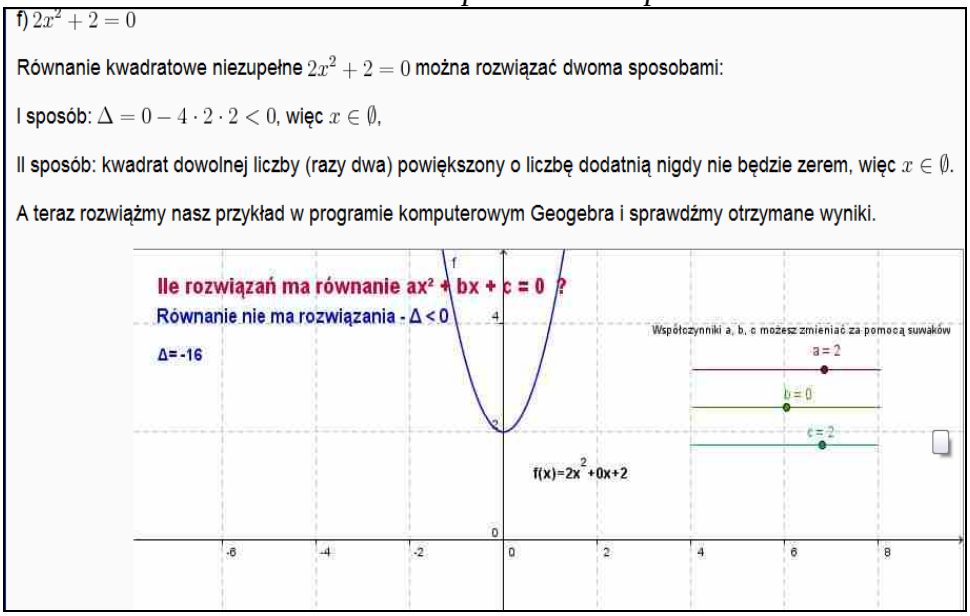

Figure 4. Section of e-learning course. Activity "Lesson". *Source: http://el2.us.edu.pl/weinoe*

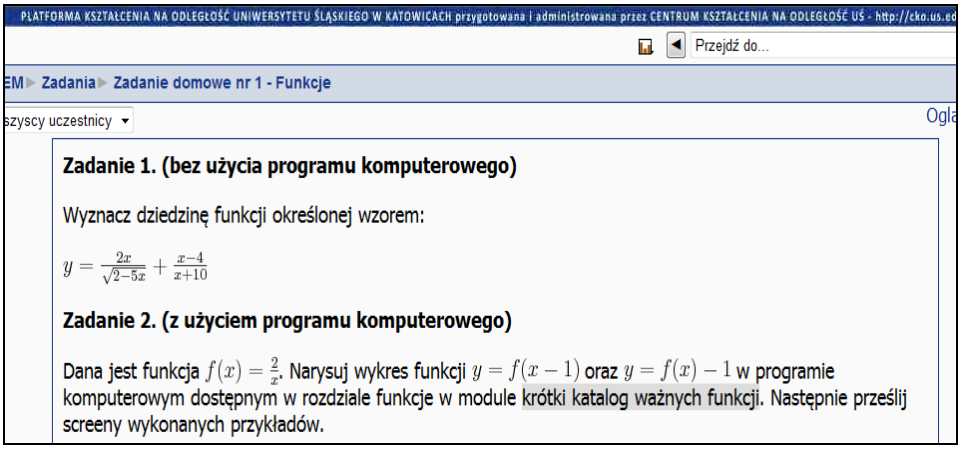

Figure 5. Section of e-learning course. Activity "Assignments".
Source: http://el2.us.edu.pl/weinoe

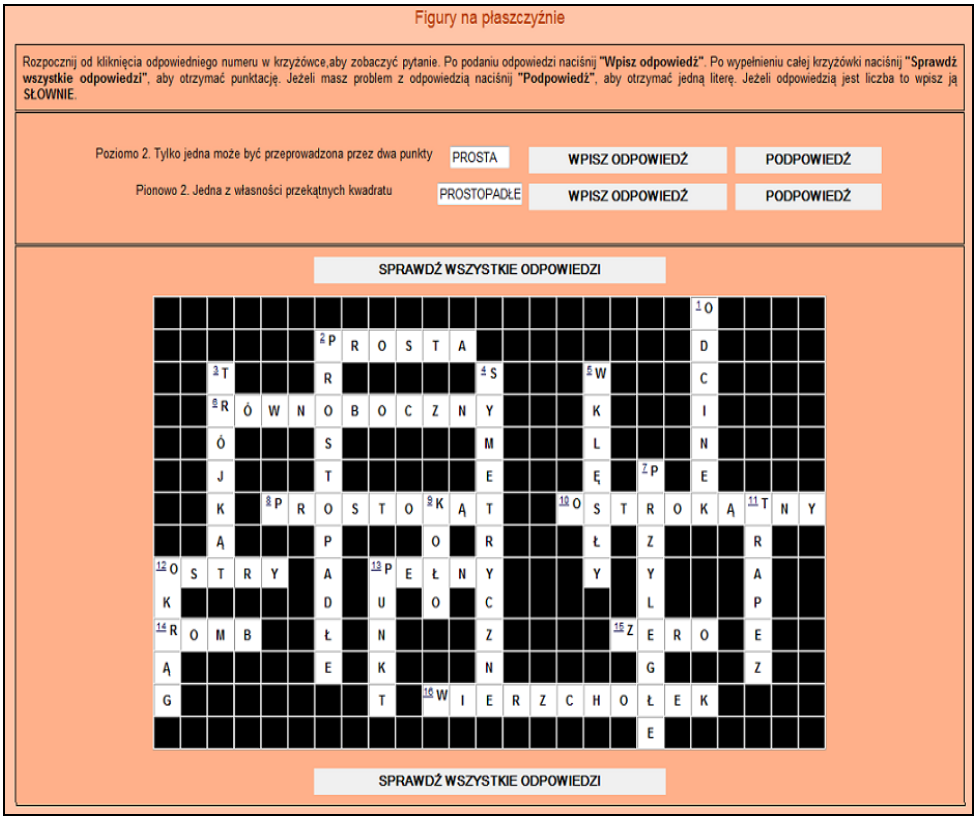

Figure 6. Section of e-learning course. Activity "Math Crossword".
Source: http://el2.us.edu.pl/weinoe

Annex 1 comprises one of the lesson scripts.

9. DESCRIPTION OF SELECTED MATHEMATICAL COMPETENCE IN USING AND CREATING INFORMATION IN CONTEXT THE RESEARCH

A student who is about to sit the final school-leaving examination in mathematics has skills in:

1) The use and creation of information.

The student interprets a mathematical text and formulates the mathematical results.

The student is able to:

- read the information resulting directly from the content of the problem;
- apply a given formula or specified manner of proceeding;
- perform routine procedure for typical data;
- clearly write up the course and outcome of the calculations and the resulting answer.

Table 2.

Linking competences in the use and creation of information to activity, types of teaching materials, computer programs, thematic scopes, and theories of teaching and mental operations.

Activities	Lessons, Tests, Homework, Forum
Types of teaching materials	PPT, PDF, Educational Videos
Computer programs	GRAN-2D, Geogebra, HEXelon Max Calculator
Thematic areas	real numbers, sequences, trigonometry, functions, analytic geometry
Theories of learning	and development of teaching theory, the theory of constructivism, cognitive theory
Mental operations	analysis by synthesis - abstraction - a generalization

Source: Own

10. CONCLUSIONS FROM RESEARCH CONDUCTED

In the course of theoretical and experimental studies the following **results** were obtained:

- A psycho-pedagogical basis was specified for increasing the effectiveness of the process of developing theoretical knowledge and practical skills (competencies) of students from upper high school grades, based on the use of selected computer programs and an e-learning course;
- A number of elements were developed of new information technologies for the teaching of mathematics for use in teaching and for generalization and systematization of knowledge of main aspects of the math curriculum , aimed at raising the level of mathematical competence of students;
- An e-learning course was developed to support learning in the traditional form and to allow for its analysis and correction, along with the implementation of the basic functions of control and coordination of students' cognitive development , taking into account the requirement for them to use relevant components of Moodle system;
- teaching methodology recommendations were developed on the use of selected computer programs and the e-learning course to generalize and systematize important branches of mathematics in order to raise the level of mathematical competence of upper high school grades;
- a pedagogical experiment was conducted and its results were processed which confirm the effectiveness of the proposed educational components of new information and communication technologies: e-learning course, selected computer mathematical programs and handbook for teachers and teaching materials for students.

The research results allow for the following conclusions:

- development of students' competencies can be effectively attained based on the content, which provides the following sequence of mental operations: an analysis by synthesis, abstraction (extracting priority compounds and relationships), semantic generalizations (explanation and how to resolve the overall absorption, ideas,

patterns, principles, characteristics, properties of problems of a given type) and implemented provided that information and communication technologies are systematically used in learning;

- organization of the learning process based on the theory of development learning, post-stage activity formulation theory, using selected computer programs and the e-learning course allows to ensure efficiency as well as the shaping and development of mathematical competence;
- in order to be able to implement the basic control functions including timely adjustments of knowledge, where necessary, and the most effective control in learning activities of students, it is necessary to systematically use information technology including an e-learning course and selected computer programs;
- in order to achieve the most efficient organization of students' cognitive and learning activities it is necessary to effect a rational and focused integration of traditional teaching methods and new information and communication technologies.

The obtained results allow to identify some directions for further research:

- investigating the problem of organization and combination of various forms of scientific and educational activities in the course of teaching the most important branches of mathematics, using computer programs and an e-learning course;
- varying the content of courses (for the ambitious students (optional), compensatory purposes (correction)) in order to provide individualized instruction.

CONCLUSION

The article addresses the use of a proprietary theoretical and methodological computer-oriented system for the development of mathematical competence of high school students. The authors first present the concept of the research, then the relationship between the components of the education system for the development of mathematical competence of students. Next they discuss the concepts of methodology guidance for teachers, present a description of e-learning course and a sample lesson plan. These were used for research carried as part of the dissertation, which is being prepared at the Pedagogical Faculty, University of Ostrava.

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Annex 1

Topic: Solving systems of equations, one of which is at least the second degree

Class: II basic level.

School: secondary.

Time: 45 min

Lesson Objectives:

Formation of selected mathematical competences in the use and interpretation of the representation

General objectives:

– Acquisition of skills for drawing graphs of linear and quadratic functions and solving equations by the graphical method. Familiarization with the computer program GRAN-2D, acquiring skills to use the program to draw graphs of linear and quadratic functions and their analysis.

Specific objectives:

At the level of theoretical knowledge, after the lesson, the student should:

Remember:

- The method of solving systems of equations, of which at least one is a second degree, by the graphical method.
- how to operate computer program GRAN-2D;
- how to operate the e-learning platform based on CLMS Moodle;

Understand:

- The importance of skills in using computer program GRAN-2D;
- The importance of skills in using the e-learning platform based on the CLMS Moodle.

At the level of skills the student should be able to:

In typical situations:

- Analyse possible situations; Determine the number of solutions of equations, of which at least one is a second degree.
- Use the e-learning platform on CLMS Moodle;
- Provide two curves graphically in GRAN-2D;

In practical situations:

- Justify the usefulness of the computer program GRAN-2D in the teaching of mathematics;
- Justify the usefulness of the e-learning platform based on the CLMS Moodle in teaching mathematics.

Methods:

- feeding (lecture, presentation);
- piecemeal research (working with the source material, work in teams of two).
- Functional.

Teaching aids:

- Books:

– M. Karpiński, M. Dobrowolska, M. Braun, J. Lech, Matematyka 1 – Zakres podstawowy, GWO, 2003, ISBN 83-88881-19-1

– D. Masłowska, T. Masłowski, A. Makowski, P. Nodzyński, E. Słomińska, A. Strzelczyk – „Zbiór zadań i testów maturalnych do

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– Cewe, H. Nahorska – „Matura z matematyki od roku 2010 – zbiór zadań maturalnych z zakresu kształcenia podstawowego" Wydawnictwo Podkowa, Gdańsk 2009, ISBN 978–83–88299–77–3.

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– Kiełbasa – „Matura z matematyki 2010. Zbiór zadań – poziom podstawowy" Wydawnictwo Lubatka, Warszawa 2009, część 1, ISBN 978-83-929478-1-3.

– Zhaldak M., Smyrnova-Trybulska E., Viciuk O.: "Geometria z GRAN-2D", Poradnik metodyczny dla nauczycieli. Wyższa Szkoła Zarządzania i Marketingu w Sosnowcu, Katedra Edukacji Informatycznej, Uniwersytet Śląski, Filia w Cieszynie, - 2005. - 124s.

- **Internet Resources:**
  - Website containing information on GRAN educational program package and demo versions of the programs - .http://www.gran.ata.com.pl/ (access 15.07.2010)
  - Website containing specimen school-leaving examination papers - http://www.operon.pl/matura_z_operonem/ (access 15.07.2010)
  - Website offering interactive exercises, videos, e-lessons, multimedia presentations - http://scholaris.pl/ (access 15.07.2010)
  - Website containing examples of online lessons, tests, crossword puzzles, games - http://www.interklasa.pl/ (access 15.07.2010)
  - Website offering GeoGebra free math software for independent studying and teaching - http://www.geogebra.org/cms/ (access 15.07.2010)
- Computer -19 assuming 1 student per computer station;
- Computer program GRAN-2D;
- E-learning platform based on Moodle CLMS;
- E-learning course;
- Questionnaire for students available on the e-learning platform.

Course of lessons

Part I. Introductory:

- (5 minutes) Welcoming and inviting students to work together;

– Writing lesson topic on the blackboard;
– Explanation of the objective of the class;
– Switching on of the computers.

Part II. Fundamental part:

– (5 minutes) Have students recall how to operate the e-learning platform based on CLMS Moodle and the computer program GRAN - 2D; teacher points to the module on the platform where the available information concerning the operation of the program GRAN - 2D for examples using it of solving tasks about quadratic functions by the graphical method (Figure 7, 8).

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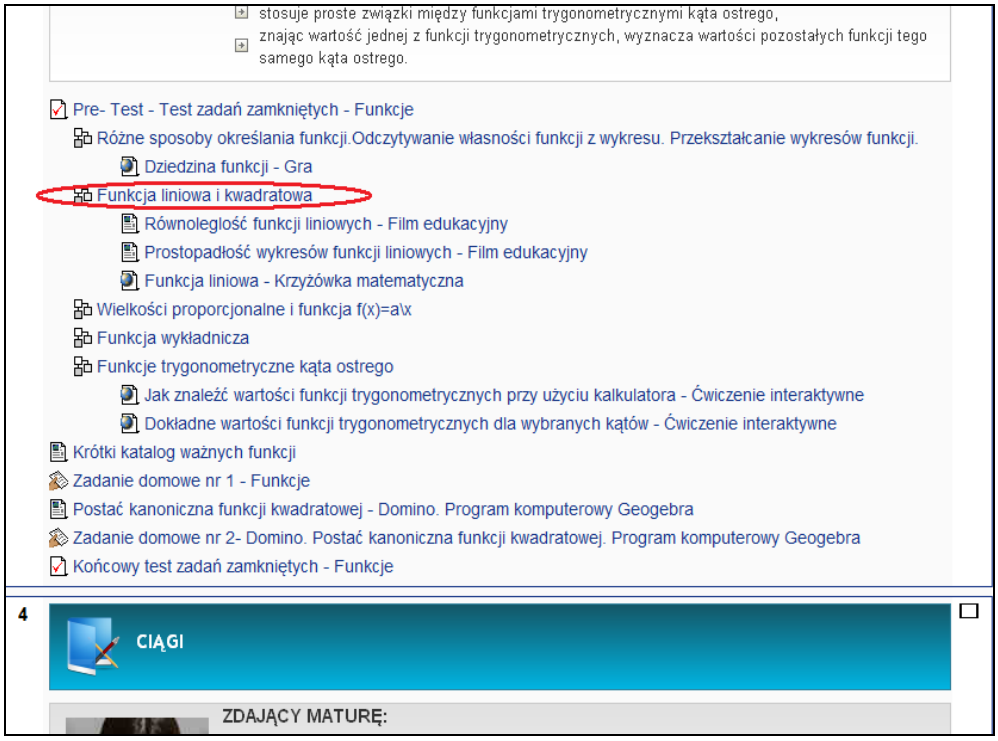

Figure 7. Section of the e-learning course. Lesson activity "Linear and quadratic functions", containing examples of solving tasks by the graphical method, using a GRAN-2D computer program.

Source: http://el2.us.edu.pl/weinoe

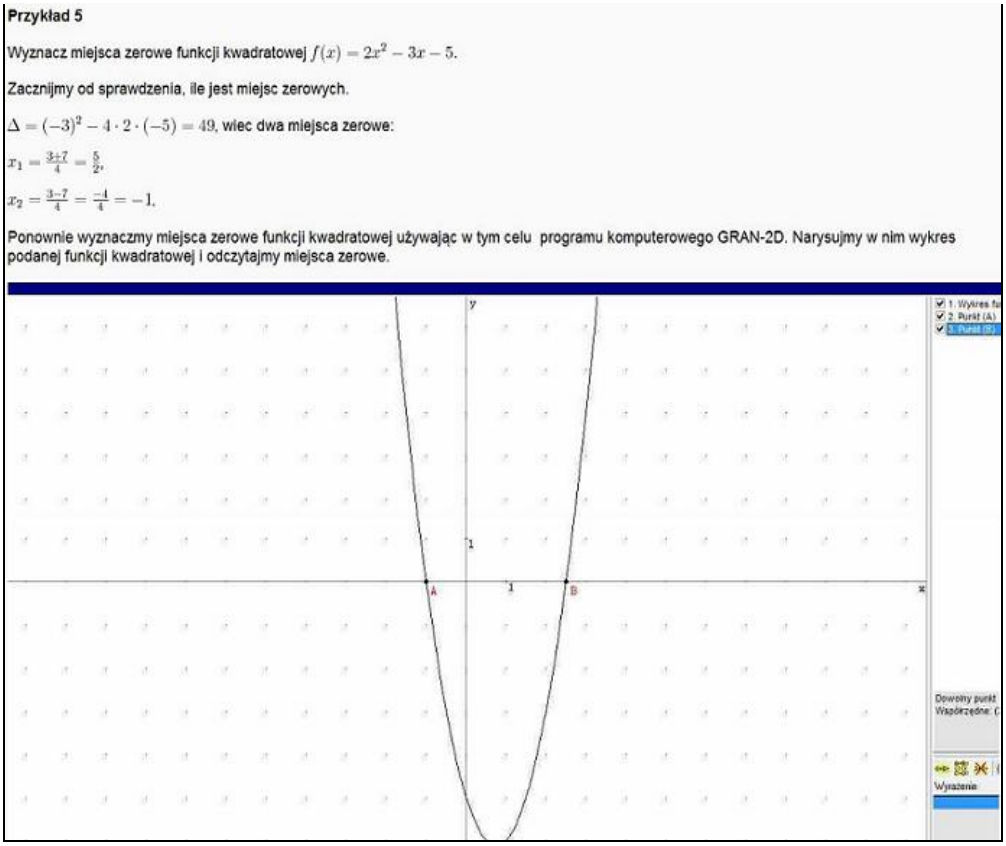

Figure 8. Section of the e-learning course. Activity Lesson about the use of GRAN-2D.

Source: http://el2.us.edu.pl/weinoe

– (10 minutes) Running GRAN-2D. Once the program is launched, a window opens which shows a Cartesian coordinate system. The teacher introduces students to the operation of the program and discusses individual icons and tabs. Indicates that the *function graph* tool is for drawing a graph of graphs of functions. Asks the students to display *the function graph* dialog window and to set the data range from -10 to 10 (for both axes OX and OY). This functionality inserts both standard functions and parametric as well as polar ones. Here one can enter the model function, define the scope of arguments, colour and line type. The teacher writes on the blackboard model of the linear function y = - 2x + 2 and asks the students to insert this function. Reminds the students that when entering the formula, they should use the symbol "*" as the sign of multiplication. So the formula should look like this: y = - 2 * x + 2 (Figure 9)

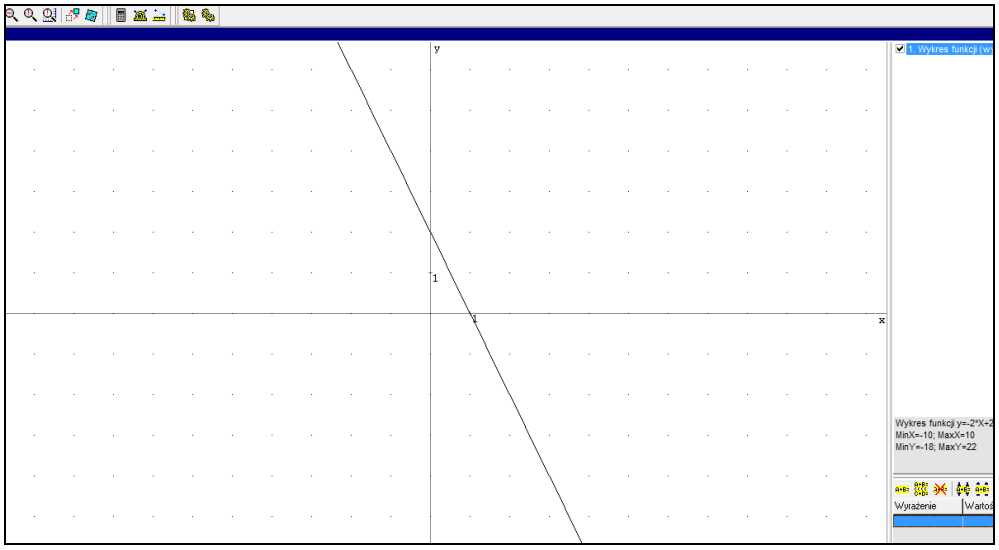

Figure 9. Line y =- 2*x+2, drawn in the GRAN-2D.

The teacher asks the students to insert a quadratic function y = x2 - 3x – 4. Reminds the students that a power of two is written as ^ 2. Students are given some time in which to try out different options for changing line style and colour, etc. (Figure 10)

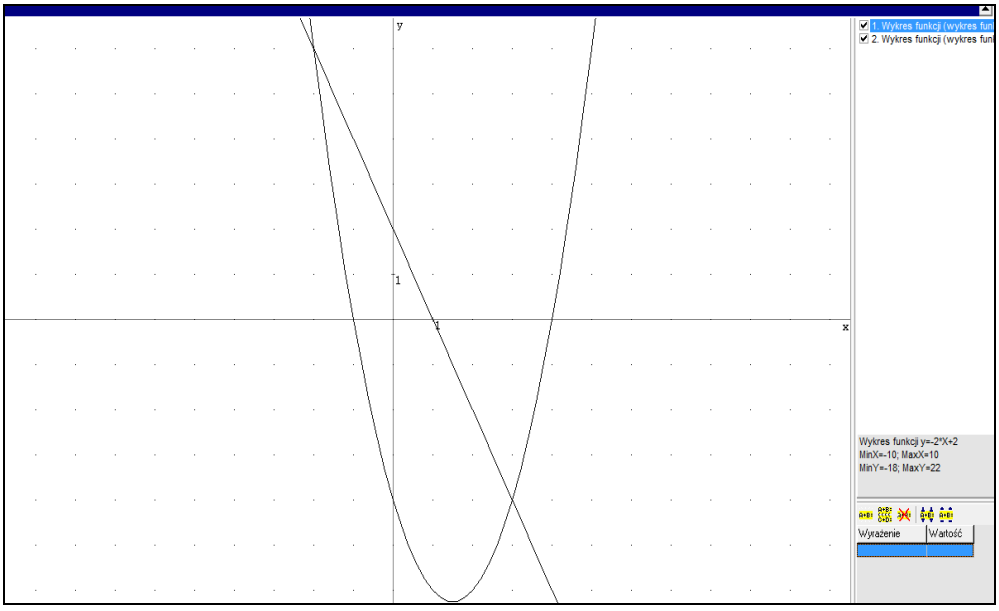

Figure 10. Parabola $y = x^2 – 3x – 4$, drawn in the GRAN-2D

The teacher reminds the students that the solution is the points of intersection of the two curves. She/he asks how many solutions there are to this system of equations? She/He asks the students to read the points of intersection and write down the solution in their notebooks (-2, 6) or (3, -4). (Figure 11)

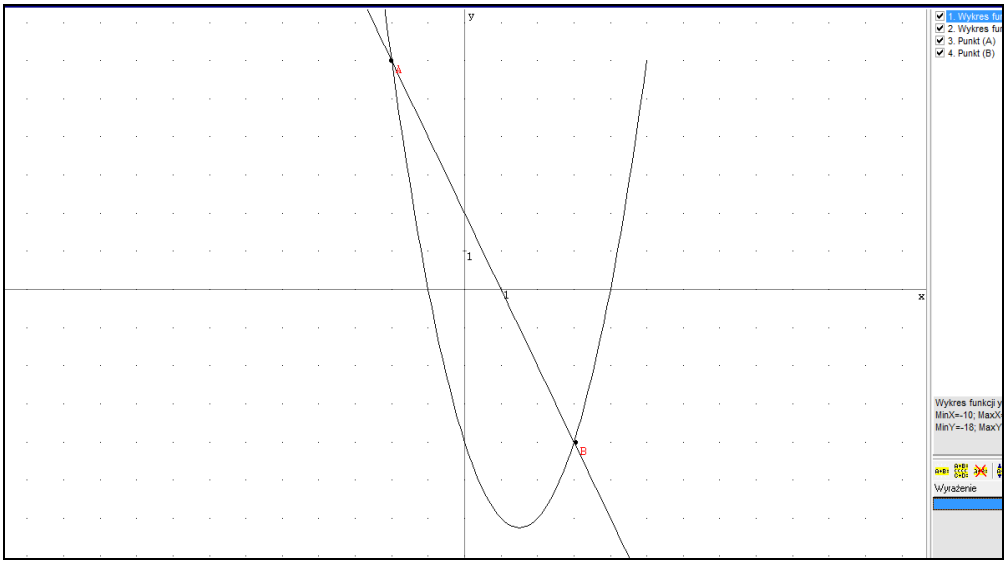

Figure 11. Designation of common points of the line and parabola in the GRAN-2D

The teacher asks how many solutions there can be to a system consisting of a straight line and parabola, and how many solutions there can be to a system consisting of two parabolas? She/he shows the location of the problem on the e-learning platform and asks the students to solve systems of equations included.

– (10 minutes) Students solve the given problem using the computer program GRAN-2D. Students can see examples of unsolved problems in the Lesson activity: “Systems of equations leading to quadratic equations, using GRAN-2D computer program". Then use the module ”Task’’ (Figure 12, 13) in the course send screenshots (screen copy) of the problem as image files to the server.

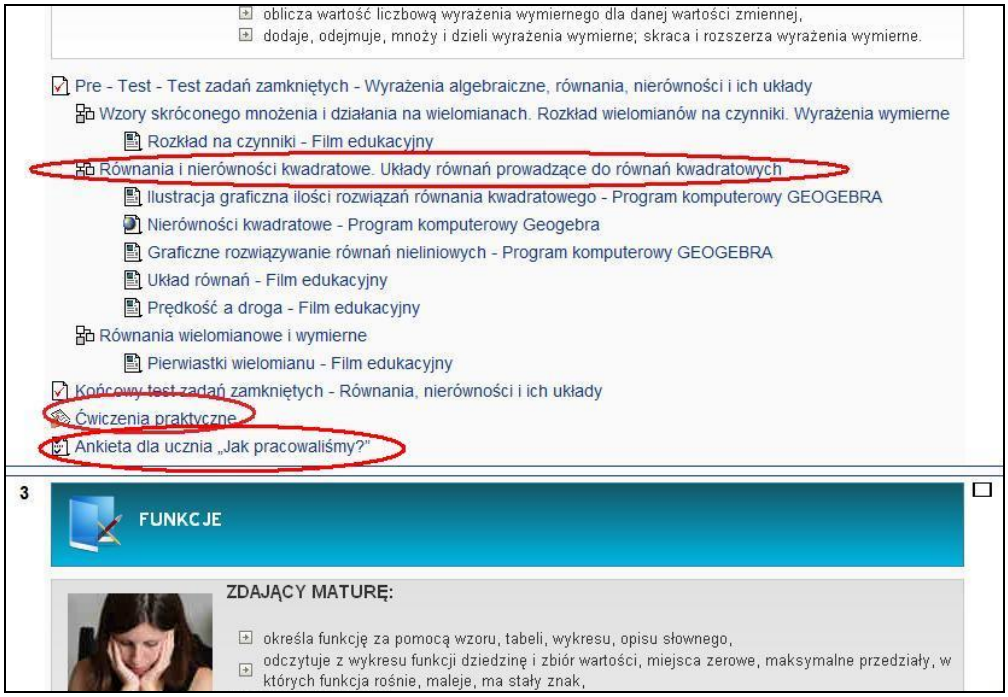

Figure 12. Section of the e-learning course. Activities: Lesson "Systems of equations leading to quadratic equations, using GRAN-2D computer program", Task, Questionnaire.

Source: http://el2.us.edu.pl/weinoe

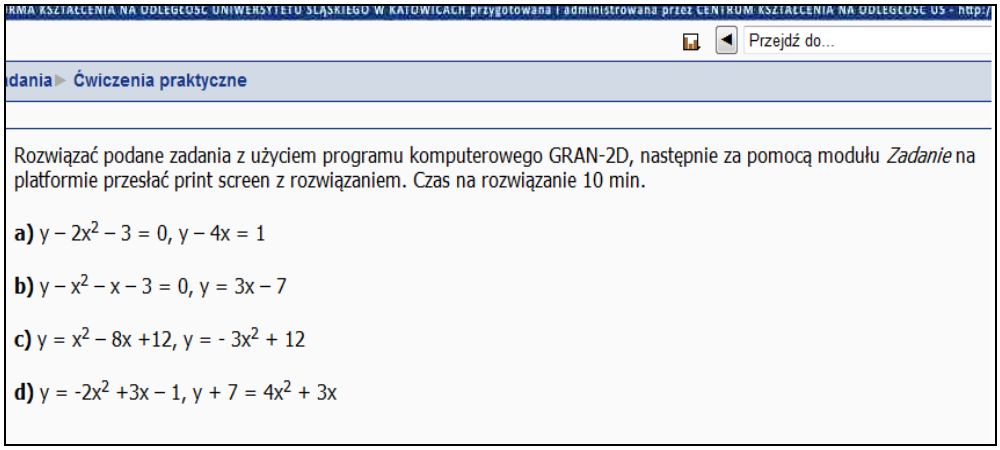

Figure 13. Section of the distance courses. "Task" activity.
Sources: http://el2.us.edu.pl/weinoe

Part III. Completion and recapitulation of activities:

- (5 minutes) Summary of lessons.
- Students turn off the computers.
- Thanking students for participating in the lesson and working together. Invitation to use the computer program GRAN-2D and e-learning platform based on the CLMS Moodle.

Practical exercises

– Solve the given problem using computer program GRAN-2D, then use the module ”Task“ in the course task to send a screenshot (screen copy) the solved problem as an image file to the server so that the teacher can inspect it. Time available: 10 min.

(The teacher shall give one problem to each group)

a) $y - 2x^2 - 3 = 0$, $y - 4x = 1$

b) $y - x^2 - x - 3 = 0$, $y = 3x - 7$

c) $y = x^2 - 8x + 12$, $y = -3x^2 + 12$

d) $y = -2x^2 + 3x - 1$, $y + 7 = 4x^2 + 3x$

Summary of items from the lesson:

– Talking about ways to solve a graphical system of two equations, one of which is at least the second degree, and analysis of possible outcomes (alternatives) solutions,

– Discussion on the effectiveness of e-learning platform Moodle and the computer program GRAN-2D,

– Students’ completing questionnaires "How have we worked?" available on the e-learning platform (Figure 12, 14.).

Survey for the students "How have we worked?"

1. Was the method of conducting lessons interesting for you?
2. Was GRAN - 2D helpful when discussing the topic?
3. Did you take an active part in lessons?
4. Do you remember a lot of information from the lesson?
5. Would you like this method to be used in math lessons?

6.

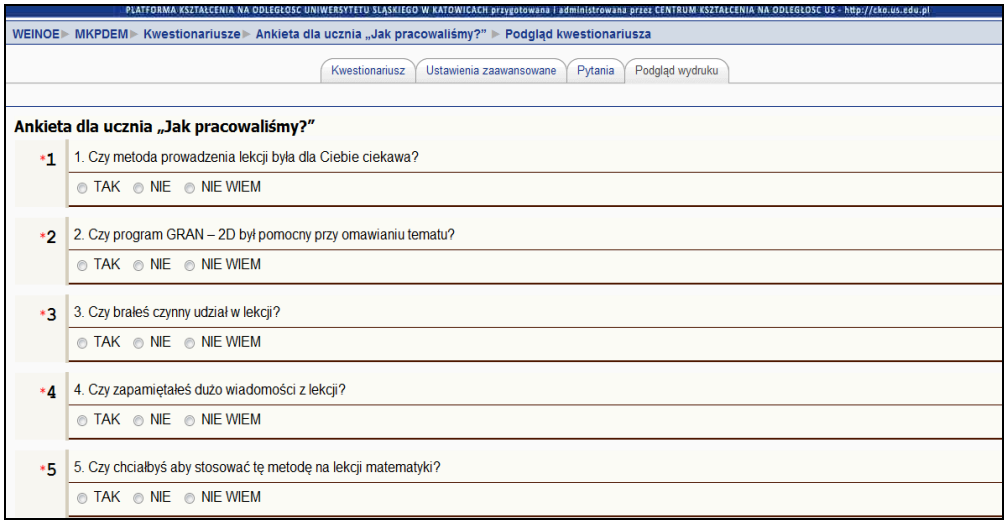

Figure 14. Section of the e-learning course. Activity "Questionnaire – survey for the student summarizing the lesson.

Source: http://el2.us.edu.pl/weinoe

DISTANCE LEARNING IN SLOVAK AND CZECH REPUBLIC

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Abstract: *Selection of the appropriate forms of learning (traditional learning, distance learning, e-learning) at different school levels is a basic problem of organization of teaching. According to E. Petlák it is a process in which the student acquires the information and activities, creates knowledge and skills, develops physical and mental abilities and interests. Nowadays, in addition to traditional learning, mainly the usage of information and communication technology (hereinafter ICT) is getting more important, especially in conjunction with e-learning. The idea of e-learning is not a new one. It was preceded by so called Distance Learning which has its origins almost 100 years ago while the distance method represents the method of the educational process, in which either the teacher or pupils are not in one common room, but they are away from each other in some way.*

Keywords: distance learning, e-learning, tutor, study supports.

INTRODUCTION

Nowadays, realisation of distance learning at the same level as classical learning, eventually as its complement, is nothing exceptional. Acute necessity to widely apply distance form of education results mainly from the socio-economical phenomena related to providing access to the education for all members of information society being created in recent years. In developing countries, it represents a tool for elimination of secondary analphabetism caused by prolonging of man's life and faster ageing of his knowledge (Juszczyk 2003).

Alike Juszczyk, Burgerová (2008) also responds to current state of educational system and knowledge level of the population – she says that economic and social development cannot be expected without ascendant

curve of the knowledge growth. Development of new technologies and related increase of the number of new devices enters the area of classical education which requires changes not only in forms but in the teaching methods as well. Classical education in formal school system is step-by-step transformed into modern, flexible and effective education at all levels of the educational system incorporated with increasing exploitation of ICT. Acquisition of new competences, knowledge and abilities is becoming unthinkable necessity of every individual whether it is a teacher or a student. „The teacher is still dominant person of educational process but he changes from an authority to an advisor who helps to orientate in problem solving."

In Slovak Republic, recent years have brought several serious changes in the educational politics. Acceptance of new school reform which was discussed in educational and training circles for a long time was the greatest of these changes. According to the reactions of some experts, the new school act was the first really reformed act that changes the whole educational system from its basis and gives it modern and flexible form.

1. DISTANCE LEARNING – BASIC CONCEPTS

It is not so easy to clearly define distance learning. Especially in the foreign literature we come across various concepts such as distance education, distance learning, distance teaching, etc. The authors of the publications focusing on this educational method often diverge in their definitions. Let us take the definition of T. Goban-Klas (as cited in Juszczyk 1999, p. 9) as an example. He states that distance study (telenautics) is an educational method that replaces face-to-face contact between teacher and student with mediated contact. According to Průcha (2000) it is a multimedia form of guided study where teachers or tutors are permanently or mostly separated from the students during the education. Multimedia form in this case means not only the utilization of ICT tools, but usage of printed materials as well because of their usefulness in study materials' mediation. Geoffrey A. Grimes (2011) defines distance learning as "formal access to the study where major part of the teaching-learning process is realised with teacher and student separated by some distance." In his reasoning he also considers: "Bring the information to the student via technology, not the student to the information."

Distance Learning as a new form of education appeared approximately in the half of the 19th century in England where the stenography education started to be realised in a correspondence form. Very quickly this method spread into other developed countries such as Germany, Austria-Hungary, Canada and

France. It is necessary to note that thanks to the long history of these countries this form of education has not only stable fundamentals but it is also embodied in the constitution which enables the students to develop their knowledge and abilities within so called life-long learning. According to Zlámalová (2008) it is not possible to realise this form of education without the contribution of a state (or government) nowadays. There are two basic system approaches:

1. Autonomous institution for distance learning,
2. Educational activity within a study programme at a university.

Based on this dual system we differentiate six models (eventually seven – the last one is a combination of the other six models) of distance learning according to V. Jochmann (as cited in Palán 1997). The British model is considered the basic one. It is caused mainly by the historical point of view as the main representative of this model - Open University (OU) - was the first distance university in the world and it currently operates in several countries. This model, unlike the other ones, is characterised as a large national institution which requires significant state contribution so it is used only in economically developed countries. Interesting fact is that the centres of OU are situated also in Czech Republic and in Slovakia. The British model is a typical example of a model of distance study where the students after successful graduation of a certain study programme get a degree, e.g. MBA (Master of Business Administration) which belongs among the graduate programmes aimed at the broadening of business education from the point of view of structure as well as the content. Programme is intended for the individuals with the ambitions of top management positions.

In spite of the fact that popularity and necessity of realisation of distance education increases mainly with the development of informatization, introduction and usage of ICT, according to Zlámalová (2008) there are several legislative constraints in Slovakia as well as the Czech Republic. Practically, it means that if distance learning is realised as an alternative component of university education it is not possible to allow its so called fully open form. It results mainly from the fact that legislative condition for beginning of university study is the minimal qualification degree Maturita (secondary school leaving certificate).

Among the advantages of distance learning there is the independence of the student, his ability (or rather possibility) to manage the process of study and to adjust the rate of knowledge acquisition to his needs. However, alike classical learning, also distance learning has its disadvantages. They are

rather different from those of classical learning but very often they have very bad impact on the student, mainly on the development of his cognitive and/or intellectual abilities. Among the most frequent ones there are the problems with motivation to the study itself, the feeling of loneliness of some students or insufficient entrance knowledge and abilities necessary for successful completion of the study.

1.1 Analysis of current situation in Slovakia

Usage of distance learning as a progressive method of knowledge acquisition, development of abilities and competences of the students does not have a long tradition in Slovakia, in opposition to e.g. adjoining European countries. This is emphasised by the fact that besides the legislative problems there is also a lack of study materials, their authors and organizations that would enforce this form of education whether with or without the state contribution. The change happened in 1990' especially thanks to the establishment of institutions or affiliated branches such as City University in Bratislava (eventually Trenčín), Open University and Slovak network for distance education which was composed of National Centre of Distance Education (NSDV) in Bratislava and local centres of distance education (LSDV) – LSDV in Bratislava, LSDV in Košice (since 15.12.1994), LSDV in Nitra, LSDV in Zvolen, LSDV in Žilina that were established at the universities. Later some of them were closed and some were transformed into centres of lifelong learning. However, it is necessary to note that not the legislative constraints themselves, but rather the trend in creation of online internet courses of various subjects with often methodologically unreasonable study materials only in the form of PDF files and sometimes PPT presentations caused the declension from the traditional form of education and the degradation of the concept as well as the attitude to distance education. Fortunately, in recent years the mentioned trend does not exceed the trend of evaluation of e-learning courses. Therefore thanks to the relatively high interest of the students, dynamically developing multimedia and Internet and high publication costs we can observe certain shift in design, creation and realisation of really distance courses. These are available not only for the students of certain faculty or university but also for the students of other universities and even for the teachers and other people outside the university.

2. LIFELONG LEARNING VS DISTANCE LEARNING

Both forms of education are realised either within the university education or via independent educational institution. They are closely related and therefore

mutually connected. Under the concept of lifelong learning we understand a process which is practically inevitable for everyone during one's life – there are various types and forms of education, from the kindergarten institutions to the secondary schools or universities, continuing with the doctoral study or updating and/or replenishing of one's knowledge and abilities via requalification courses, attending of hobby groups, reading literature, etc.

With regard to the long definition above we can understand the distance learning as certain subset (eventually we can call it a method) of lifelong learning while the greatest emphasis is put to the interest and opportunities of the students that are supported mainly using ICT, teachers' approach, accessibility and exploitability of study materials (whether in electronic or printed form), etc.

Education is regarded as a long-term process in which the student systematically and frequently develops his competences and abilities. In traditional education this happens within so called presence study at school. One of the characteristic features is a teacher as a mediator of certain knowledge according to the syllabus, very often regardless the entrance knowledge of the students. This fact basically leads to useless memorisation and disordered time schedule of the students resulting in their exhaustion and disinclination to study and its further continuance, eventually also in non-completion of objectives and limits or unsuccessful final examination. There are a lot of examples of inefficient and improperly allocated time. For instance, the following timetable (Figure 1) illustrates a situation when the optimal organization of educational process was not followed. Specifically, the timetable was not designed according to the performance curve of the students – see the first lesson on Thursday (Biology) or the last lesson on Monday (English). Furthermore, the number of lessons in this day is improper which resulted in increased number of so called more difficult subjects that students have to attend.

Distance learning, unlike classical presence learning, is characterised mainly by these facts:

1. study programmes are based on differentiated educational needs of target groups of students,
2. it is based on distance learning technologies, i.e. mediated via ICT or other technical tools that enable the students to work with study materials and communicate with consultant (lector, tutor) practically whenever and wherever. (Průcha, 2000)

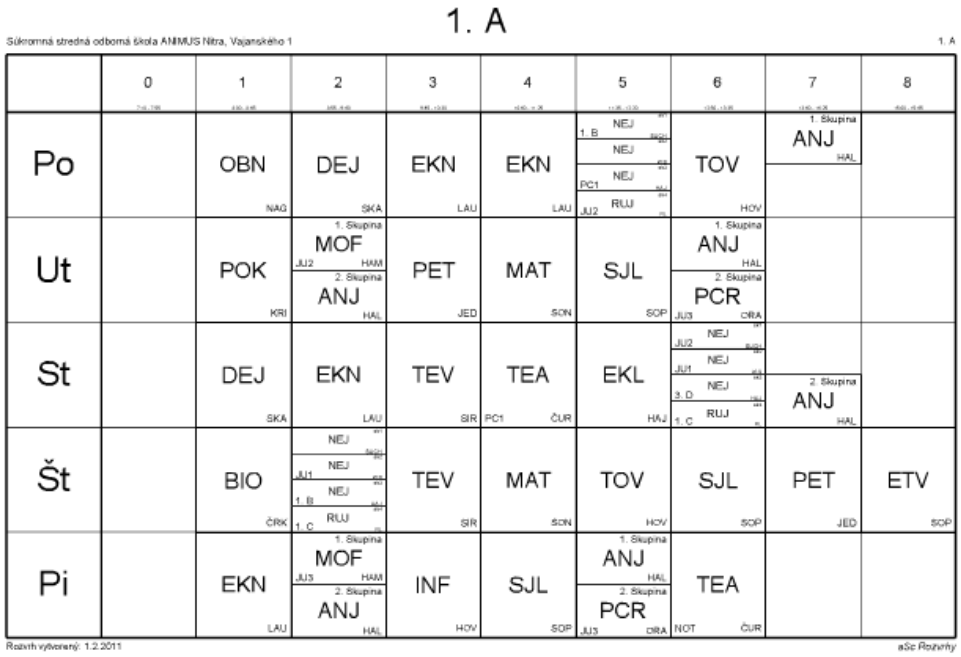

Figure 1. Example of inefficient time exploitation from the point of view of development of students' abilities and competencies and acquisition of necessary knowledge from various fields

Distance learning is considered as system matter that needs to be perfectly thought over and specified from the point of view of organization as well as methodology. Organization in this case means market analysis, creation of author collective, organizational assurance of pilot course, design, creation and distribution of study materials. Zlámalová (2008) says that every methodological support of a student in a way also minimizes the negatives of the educational method in case of incorrect organization but on the other hand every educator's provisional solution might be a great risk for overall success of the study.

That is why a great emphasis is put not only on organization but on the study materials (texts) as well. Under study material we understand didactically built-up material that facilitates the study as much as possible. It is realised either via sequential proportioning of study materials, controlling of acquired knowledge and abilities or active processing of these outcomes that would enable interactive influence on the student (AHS – adaptive hypermedia systems – are great example).

CONCLUSION

Lifelong learning represents a necessity nowadays. It is not only a way how to develop abilities but also a possibility to be in a contact with other people with similar interests. Thanks to the development of ICT we are able to realize lifelong or continual education in a modern and very effective way. This is possible via e-learning form of education. The author of this paper says: "E-learning is closely related to such form of education that is characterized by a place of study which is transferred outside the educational institution. E-learning is in its fundamentals a subset of distance learning as well as correspondence courses, television courses, etc. From these subsets, e-learning is the largest, the most integrated and the most interactive subset of distance learning." (Turčáni 2005)

Of course, e-learning is not cure-all, but there is a presumption that thanks to e-learning it will be possible to realise distance education in near future also in such countries where currently are certain legislative constraints, e.g. Slovakia and partially also in Czech Republic where the problem was relatively successfully solved by University of Ostrava which can be seen in its bachelor study programme Applied informatics at the Faculty of Natural Sciences.

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E-LEARNING APPLIES ATTRACTIVE TEACHER ACTIVITIES FOR THE DEVELOPMENT OF KEY COMPETENCIES IN THE FIELD OF INFORMATION TECHNOLOGY

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Abstract: *This paper is centred on the analysis of attractive teacher activities to support interactive communication between students and teachers for the development of key competencies. Suitable key competencies are needed for optimal information technology implementation. An analysis of selected study activities (Wiki and Database) is based on the object approach with the help of Petri Nets. The created model is used for professional analysis. This analysis shows that both study activities bring along a similar volume of work, but the Wiki has a better influence on students. The reason is positive student reception of the Web site format. Databases have better use in information systems than in study activities.*

Keywords: e-learning, information technology, interactive communication, Petri Nets analysis, teacher activities.

INTRODUCTION

Terms like computers, cloud computing, information technology, and data processing are widely-known and frequently-used words. Information technology transforms almost all fields of human activity. (Brdička 2006) Information technology users use various kinds of software to support realized activities. Public aims are success and profit based on individual access. This individual access also has an important place in information technology implementation. Required information is accessible in many books, articles, blogs, video-records on the Internet, and other information systems. Optimal application of information technology depends on various styles of personal disposition. Personal dispositions and styles of work have

an effect on information technology use in practice, and it is an important factor for the attainment of desired results. Optimal use of information technology means to have the needed tool, software, and hardware for the realization of selected activities with the support of computers. The combination of these components creates the base infrastructure for information technology implementation. There is no problem to obtain the selected components. Users can buy specific software and hardware or they can use open-source and hosting form resources. Another necessary condition is having the skills to use these components and to be able to work with data and information.

This necessary condition is the main differentiator between information technology users. Information technology application is a public mater, but only some of these users achieve success and benefit in their activities with computer support. These users have optimal skills, knowledge, and access to needed data and information which all transforms into the best practices. They have suitable key competencies. Key competencies development is a highly individual matter; therefore, education must offer a variation of study documents and education forms. Validated methods are e-learning, interactive communication, and video-recording. The benefit of video-recordings is based on easy access to information along with a recommended procedure, visualisation support, and repetition. Interactive communication is important for discussions between students and teachers with the aim to know and explain needs, expectations, perceptions, and understanding. E-learning is an educational form with easy access to study documents, materials, and other activities in optimal time by student preferences. An ordered combination of these methods helps to optimally develop of key competencies in the field of information technology.

1. KEY COMPETENCIES IN THE FIELD OF INFORMATION TECHNOLOGY

Key user competencies have an impact on information technology implementation and they are an important factor of success in realized activities. Diligent and conscientious work, reliability, and timely completion of tasks are some of the conditions to successful activities. The level of success depends on the individual's take on how to use information technology and overall visibility in society. Today's dynamic and information society allows users to show their skills and talents based on specific characteristics of available hardware and software. There are many

reasons why key competencies generate a personal style for relevant information technology use:

- A personal style for suitable information technology use affects decisions of customers, competitors, and other users.
- Users generally believe what they see and what they can verify.
- Users have little time and they often rely on first impressions.
- Success is a relative factor and it requires users to actively use information technology professionally.
- An activated personal style distinguishes individuals and firms in information technology use from others.

Suitable information technology use needs to have extra forms for key skills, personal style, and image in comparison with other users. These key competencies affect customers, competitors, and other users with respect to principles for optimal information technology implementation based on dynamic information society needs. Appropriate information technology use requires all expertise to achieve the best results. Personal professionalism and approach is important for creating an appropriate style of information technology use. These aspects are interconnected into a whole, which can be implemented with benefits. Necessary tools help to optimally finish realized tasks via essential applications, information, and database systems with links to Business Intelligence (BI) (Oracle Database Concepts, 2011), Customer Relationship Management (CRM) (Zákazníkova loajalita rozumem a citem, 2008), and further accessories to consolidate active information technology use.

Good ways of information technology application can be defined as sensitive, skilful information technology implementation based on respecting the interests and needs of users. Professional activation of information technology requires:

- Working and preparing necessary information into accurate and concise documents.
- Applying modern and proven practices that ensure professional performance with respect to time, space, and priorities.
- Enabling an appropriate system of security based on access rights for higher clarity and confidence.

The fulfilment of these areas requires suitable ways of applying information technology in companies, customers, partners, and competitors. The reason is

that not all methods are relevant for optimal activation of information technology and successful support of specified activities. Attractive teacher activities can help in searching for a new and suitable resolution for educating the Net Generation (Oblinger, D., G., Oblinger, J., L. 2005).

2. ATTRACTIVE TEACHER ACTIVITIES FOR INTERACTIVE COMMUNICATION

Teachers have a number of modules for course creation in the Moodle environment (Moodle presentation, 2011). These modules create a diverse spectrum of their content. Setting modules and their individual customization help in various situations and aim to better education. Standard modules allow to insert selected teacher activities into the course as:

- Automatically evaluated tests with different types of tasks.
- Educational content according to SCORM specification.
- Forums with the possibility to send information via e-mail.
- Glossaries and databases for reminders important terms.
- Questions and tasks with an option to evaluate.
- Survey for immediate opinion identification.

These teacher activities have great potential for interactive cooperation between students and teachers, teachers and students, students and teachers themselves. The Moodle system (Moodle, 2011) offers attractive activities to support interactive communication via the "Add an activity" menu with items like:

- Database,
- Forum,
- Lesson,
- Survey,
- Test, and
- Wiki.

Database allows teachers and students to create, display, and search a set of records. The format and structure of these records does not have limits; records may contain pictures, data files, hyperlinks, or texts. Forum is an

optimal activity for discussion. Forums can include evaluation of existing contributions by other students or teachers. Contributions can be viewed in selected formats with attachments. Students and teachers can receive contributions by e-mail. The teacher can impose a subscription on everyone in the class. Lessons consist of a set of pages. A standard page ends with a question and available answers. A student can go to the next page or he/she returns to the previous page with respect to the current answer. The path through the lesson can be linear or branched with dependence on the nature of the study material. Surveys offer the teacher to define questions and to specify a number of answers available for selection by students. This allows to create a quick view, which can motivate students to think about a given topic, decide about further action in the course, or to get research consent. Test allows a teacher to define tests with various types of tasks: students can select from several options, true/false, formed answer, short answer, matching, and numerical task. Tests can allow multiple attempts. Attempts are automatically marked and the teacher can individually select to give feedback or correct answers. Finally, Wiki enables collective creation of documents in simple mark-up language using a web browser. Wiki technology is a way of creating and updating pages. Updates are accepted and immediately published. The question is which study activities to use for better education on the basis of new perspectives to education with sharing professional experience (Dlouhá, Zahradník, Hattanová, Dlouhý 2006). Petri Nets were chosen to analyze study activities such as Wiki, Survey, or Database. Optimal design teacher activities is supported by Package of Professional Competencies from project No. CZ 1.07/2.2.00/15.0026. Project deals increasing the professional competencies of academic staff the University of Ostrava and Silesian University in Opava. The package supports the opportunities to consult selected styles of learning with recognized expert Ing. Kateřina Kostolányová, Ph.D., University of Ostrava. This acitivity is centred on Operating Systems course.

3. AN ANALYSIS OF SELECTED ACTIVITIES WITH THE SUPPORT OF PETRI NETS

A suitable analysis is realized by Petri Nets. Petri Nets are optimal tools for simulating selected activities with practical usage in operating and database systems. Simulation requires an executable and hence a formal model of the software. It should be a mathematical model in order to allow mathematical proof techniques. (Gold 2004) Created models use objects of Petri Nets. These objects create places and transitions. Places are displayed in the form

of circles and transitions are depicted as rectangle. Places and transitions are linked with oriented arcs. Benefit is easily demonstrated by offered activities and their confrontation. Realized own models are created in simulating program of Petri Nets.

The following rows show a practical application analysis with Petri Nets for creating a Wiki as one of the available activities of the Moodle system for the course "Operating Systems." The given model describes reality with objects of Petri Nets; it is displayed in Figure 1. The start point is place P1_ListCourses. This place displays the screen with registered courses of teacher. The next route leads through the transition T1_Select_Course to place P2_Course_Identification. The transition rests in the selection of a course by the mouse and the scroll-bar. Place P2_Course_Identification displays on the screen a visually marked record of the course. Next steps are intuitive. Model build follows defined places:

- P1_ListCourses – displays a list of registered courses.
- P2_Course_Identification – displays a visually marked name of the specified course.
- P3_Course_Information – displays specified groups of information, materials, and activities for editing.
- P4_Study_Activities – accesses offered activities.
- P5_Wiki – accesses needed information about Wiki.
- P6-1_Name, …, P6-14_MarkCategory – accesses items for creation of Wiki.
- P7_Course_DisplayContent – displays actual information about the course.

Needed transitions of the defined model are:

- T1_Select_Course – searches specified course (specified via scroll bar).
- T2_Display_CourseContent – selects needed information about selected course (selects course by mouse).
- T3_Editing_Course – specifies the edit mode of needed information, materials, and activities of a course (button Activate edit mode).
- T4_Add_Study_Activity – specifies the menu for the creation of a public inquiry, list of questions, database, chats, forums, glossaries, tests, Wikis, SCORM, and lessons (menu Add an activity).

- T5_Edit_ListItems-Wiki – accessible registered items for Wiki creation.
- T6_SaveAndReturnToCourse – confirms registered information created by edit process (button Save and Return to Course).
- T7_Return_ListCourses – displays all registered courses of teacher for next course select (button Deactivate edit mode to end the editing, select next course via mouse and scroll bar).

The validity of the defined model is verified by starting the given simulation. A route cycle is built from place P1 via specified transitions and places. Places P6-1, P6-2, to P6-14 illustrate items for Wiki editing. If the teacher ends the edit mode, it is important to confirm the "Deactivate edit mode" button. This activity is represented by transition T7. The next route returns to place P1.

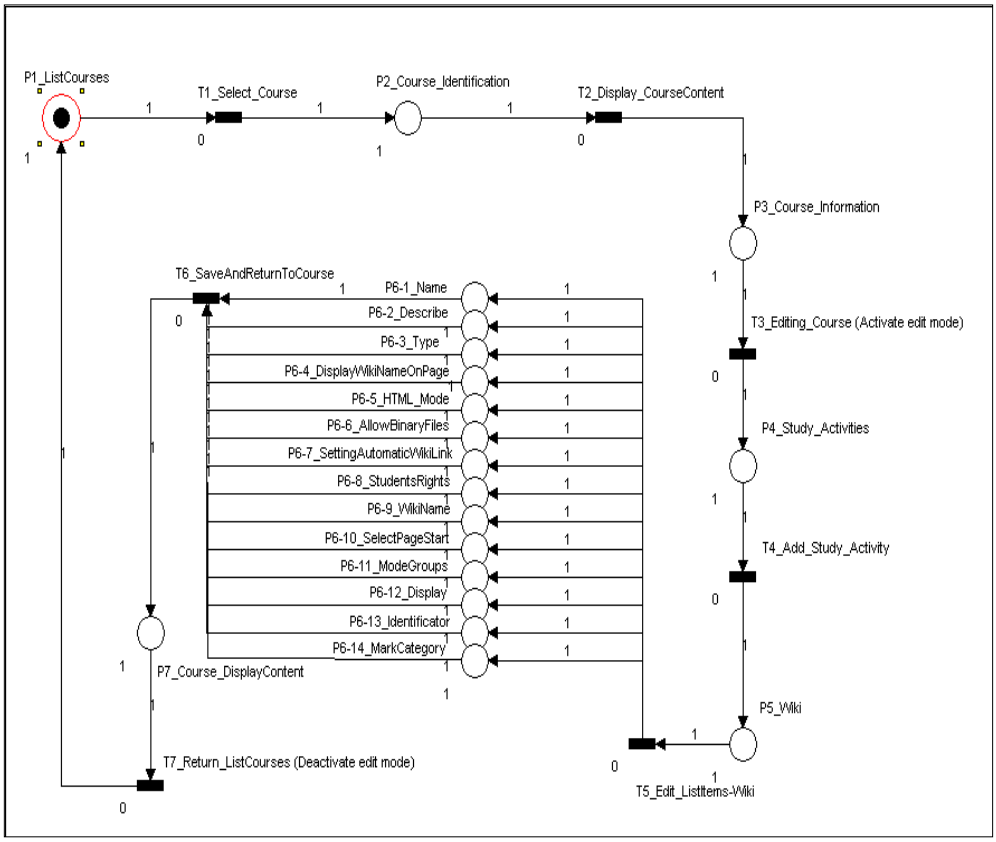

Figure 1. Method simulation for creating a Wiki in the Moodle system.

Source: Own (prepared by author)

Wiki uses the ErfurtWiki principle for implementation of the WikiWeb hypertext system in the Moodle system. This method is user-friendly and allows teachers to quickly create and edit the web site. The first step is the creation of a Wiki study activity by the "Add Study Activity" menu. Setting available items is intuitive and teachers can choose to use default values. The established site is displayed as a web link on the course page. Wiki content is updated with specialized marks (Wiki and HTML). The benefit is that existing Wiki pages can be used to create of lists by selected criteria like the list of latest pages, pages most visited, pages most updated, or recently updated pages.

A new page is created via the page name that is written in the existing page text. This page is named with WikiWords or teachers can write needed words into square brackets ("[]"). Text must be saved and a question mark ("?") is displayed after the WikiWord. The teacher clicks on this symbol for transition to the edit mode of the new page. Editing is easy; the teacher writes the given text, saving as he/she goes along. Teachers can make new paragraphs, titles, formats, lists, tables, web links, or pictures on the Wiki page. Paragraphs are separated by blank lines in the text. A small title is created with an exclamation symbol ("!") at the beginning of a line, a medium-sized title is created with two exclamation symbols ("!!"). Italicized text is made by enclosing the text between two single quotes. Bolded text is created similarly with two underscores or asterisks. List items are created by asterisk symbols ("*") as the line starts. Numbered lists are made with the number sign ("#"), using an analogous procedure. Web links are made with the words being placed into square brackets ("[]"). Web address are written into the text in standard format (for example, http://wiki.com), and this text is transferred into the web link. Tables are created with the pipe symbol ("|"). These symbols separate every cell. A picture is made by placing the object's correct address on Internet in square brackets ("[]"), for example [http://wiki.com/picture/image.bmp].

The above-mentioned model is a good point for further professional analysis based on linear algebra. Default structure of Wiki is defined as:

$$Wiki = \sum_{j=1}^{14} P_{6-j} \ ,$$

where P_{6-j} (pro j=1-14) are items for Wiki definition in the Moodle system. Further analysis uses a standard way with an incidence matrix and set of reachable markings. To illustrate the incidence matrix and the reachable markings, please see Table 1.

Table 1.

An analysis for a model with an incidence matrix and reachable markings.

	Incidence matrix							t1→ M1	t2→ M2	t3→ M3	t4→ M4	t5→ M5	t6→ M6	t7→ M0
	t1	**t2**	**t3**	**t4**	**t5**	**t6**	**t7**	**M0**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
p1	-1	0	0	0	0	0	1	1	0	0	0	0	0	0
p2	1	-1	0	0	0	0	0	0	1	0	0	0	0	0
p3	0	1	-1	0	0	0	0	0	0	1	0	0	0	0
p4	0	0	1	-1	0	0	0	0	0	0	1	0	0	0
p5	0	0	0	1	-1	0	0	0	0	0	0	1	0	0
p6-1	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-2	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-3	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-4	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-5	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-6	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-7	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-8	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-9	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-10	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-11	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-12	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-13	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p6-14	0	0	0	0	1	-1	0	0	0	0	0	0	1	0
p7	0	0	0	0	0	1	-1	0	0	0	0	0	0	1

Source: Own (prepared by author)

Accordingly, the analysis of other teacher activities from Moodle (such as Database, Test, or Forum) is available. For example, creating the Database element involves the same volume of work. There are fourteen items to specify the Name, Description, Available Form, Evaluation, or Common Settings.

CONCLUSION

Hardware, software, and data processing are well-known terms. Users use information technology to support declared aims and activities. Complex applications are freely available to interested users on the Internet and there is no difficulty in obtaining required software like a database system, operating system, and other application from CRM and BI. Suitable applications of these information technologies depend on key competencies, which are set by personal dispositions. Personal dispositions and styles of work have an effect on information technology use in practice; therefore, a necessary condition is the set of key competencies in order to use the selected software and to work with data and information. Users obtain optimal skills and knowledge with the support of interactive communication in practical tasks. Teachers often use modules from the Moodle system which offers a diverse spectrum of study activities to support education. Their benefit varies according to the method of implementation, available options, and practical use. Petri Nets were chosen to analyze the actual situation and to support easy implementation activities like Wiki and Database.

Both study activities are suitable at first glance. Teachers and students can add necessary data into a collection of information. The Database element is organized by records, and Wiki uses HTML format or the ErfurtWiki principle. The benefit of the database includes the freedom to define a database structure. Wiki allows links to other information, as well as web links. This factor is important in perceiving Wiki by students and teachers. The accessible environment is well-known from websites on the Internet. Database principles are better used in default information systems with links to BI. Selection of optimal learning styles is also supported by project No. CZ 1.07/2.2.00/15.0026 for Operating Systems course.

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II. THEORETICAL AND METHODICAL ASPECTS OF DISTANCE LEARNING

IMPLEMENTATION OF EUROPEAN UNION STANDARDS IN THE ACQUISITION OF VOCATIONAL SKILLS AT UNIVERSITY LEVEL

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Abstract*: The purpose of this article is to explore the benefits of using new technology tools such as the Moodle platform, CAT programs, to foster student interaction in learning. The first section of this paper focuses on digital literacy in the diachronic perspective through reviews of literature in the European Union, the Bologna Process and the European Council of Lisbon. Following is a presentation of digital literacy at the University of Silesia. The final section includes an analysis and description of a curriculum proposal for various educational contexts referring to acquisition of vocational skills enhanced by implementation of new technologies in the translator`s workplace, training teachers and graduates so as to raise initial qualifications and improve the provision, accessibility and quality of their careers and employment.*

Keywords: new technologies, CALL, lifelong learning, university translation training, university teaching training.

INTRODUCTION

Modern foreign language courses at academic level take into account the needs of the labour market. In doing so, these courses focus on training not only language specialists but also specialists in cultures armed with the skills necessary to be effective teachers or translators and thus able to employ new technologies. These new, or emerging, technologies offer a vast range of opportunities to promote new directions and university programs indicating a

shift in pedagogical perspectives in the European Community. The emergence of new educational environments is supported by tools that both motivate and meet the needs of the 21st-century student.

The methods and techniques of distance learning provide educators with the possibility to design excellent teaching aids, while the Internet provides young people with a greater number of options of which older generations did not and could not have even dreamt.

As a result, new technologies also seem to be beneficial tools for the modern generation of students who, according to scientists, need to be provided with strategies that can be applied on an academic, professional, and personal level (Gultert and Romeu 2009: 3). Taking into account the abovementioned issues, these strategies can be improved very well by means of both various methods and e-learning techniques. What is more, in the context of the requirements of the 21st-century labour market, there is some urgency in providing flexible studying opportunities to help students cope with challenges offered by potential future employers.

This is why, it is worth upgrading the academic process of education, particularly enhancing the future philologists, translators, interpreters, etc.; this process may support students not only during studying but also after graduating to meet the needs of the modern labour market.

1. THE EUROPEAN CONTEXT OF THE NEW QUALIFICATION

Europe faces significant challenges in adapting to the new digital economy (Gultert and Romeu 2009: 2). Tsantis (2011: 2) '[c]ountries are now linked financially, economically, socially, culturally, and politically as never before,' thus creating not only a new demand for more goods and services, but also the need to deliver and develop skills so as 'to keep pace with the emerging work opportunities.' In this scenario it is important to establish appropriate standards of quality in education at university level. The introduction of computer qualifications in higher education provide all students with the possibility to achieve transverse certified competence, 'both for their successful study and for their future vocational integration' (Cochard and Rogard 2008: 1).

There is a need for all citizens to have the knowledge required to live and work in an information society. It is important to define the new basic competences that must be facilitated by education at university level. According to Tsantis (2011: 1) '[t]he implication for educators is clear – we must rethink most of our existing educational paradigms' as '[s]tudents must

be prepared to accept, adapt to, and thrive upon change.' In this field, it should be pointed out that the process of education must deal with the needs of students.

However, in the context of new educational policy of the European Union (EU) it is impossible to build identical academic programmes in different countries. This is why, 'the European Comission decided that the assessment of the student`s level will relate to the competence acquired at the end of study, and more generally the results of formal, informal and nonfromal learning' (Cochard and Rogard 2008: 1). What is more, the first European initiative with reference to the need of harmonization, positioning of the new European qualifications framework, was implemented. The European Comission created the levels L (Bachelor`s), M (Master`s) and D (Doctorate) at the end of university programme with ECTS (European Credits Transfer System), in order to validate European degrees and qualifications for students and future employees.

1.1 The Bologna Process

Universities play an essential role. Academia is expected to respond to a wide spectrum of changes 'to contribute to the new challenges that the new technologies bring up in conventional teaching and learning methods'(UNESCO World Report 1998 in Gultert and Romeu 2009: 3).

The political objectives are set in the Bologna Declaration of 1999 to the higher education sector. In this sense, 'universities face three main challenges:

a. to qualify future professionals to fit in with the current new profile,

b. to train researchers-to-be,

c. to educate citizens for today`s society' (Michavila and Calvo 1998 in Gultert and Romeu 2009:3)

What is more, according to the Bologna declaration, on the one hand, teachers are trained to achieve the new teachers` profile, but on the other, students need to be provided with the necessary competences to cope with the demands of the labour market. According to Williams 2003 (in Gultert and Romeu 2009:3), competence means 'a set of skills, knowledge and attitudes needed to produce the desired outputs of the work place'.

1.2 The EMT requirements

European Union (EU) aims to harness Information and Communications Technologies (ICT) to develop innovative education and training practices. It

is claimed that effective integration of ICT into education can enhance learning environments and accelerate current practices.

In the light of these challenges, higher education institutions are looking for ways in which to create better studying conditions for universities.

To respond to the objectives set out above, the Directorate General for Translation (DGT) organized a conference in Brussels in 2006 (with representatives from nearly 70 higher education institutions in the EU as well as from international organizations such as UN, NATO or OECD) to support the development of training for translators in Europe. This resulted in the European Master`s in Translation (EMT) project being drawn up by DGT. This reference framework of training objectives, expressed in terms of comptences to be acquired is ‘intended as a basis, enabling the content of training sequences/modules/ programmes/ sessions to be established and the most appropriate teaching methods to be chosen' as it is 'concerned with the end competences’ (Pym 2009). The competences which lead to the qualification of multilingual experts are interdependent and presented in the six areas:

- translations service provision competences,
- language competences,
- intercultural competenes,
- info-mining competences,
- technological competences,
- thematic comptences.

It is worth noting that ‘they all lead to the qualification of experts in multilingual and multimedia communication’ (Pym 2009: 3). In order to implement new technologies, with respect to the speed and quality of a translator's work, new translation tools need to be involved in both the translator's workplace as well as university training in translation.

1.2.1 New technologies in the translator's workplace

There is a wide revolution in electronic communication so as to bring people closer to a Europe in which each person is able to translate. According to the EMT framework, the very nature of a translator's work is changing. Today, Computer Aided Translation (CAT) is a huge misnomer. The DG has invested in a translation-memory suite and machine translation architecture, which embraces data-based machine translation. It is said that ‘in specialized

domains those systems can be more efficient than human translation' (Guerberof 2009). Thus, the European Commission's Directorate-General for Translation (DGT) promotes a range of CAT tools[1] (e.g. Trados 2009) that can facilitate and enable the development of excellence in the translation process.

1.2.2 New technologies in the teacher's workplace

The revolution of modern information and communication tools has always affected the learning/teaching process, particularly that of foreign languages. In the context of the teacher`s roles that are of high importance to the multimedia aids supporting the didactic process, it should be highlighted that they have become markedly more important in the foreign language learning/teaching process. This phenomenon is connected directly with the emergence and development of technological tools which have evolved to become Web 2.0 tools or virtual environments (Depover: 2007).

On the other hand, this situation is a result of the evolution of various concepts referring to the learning process, which is perceived as similar to constructionist ideas popular in the liberal arts (Depover: 2007). Generally, new technologies can play three basic roles in the teacher's workplace:

a) the role of the tutor,

b) the role of a tool,

c) the role of the tutee (Levy: 1997; Mangenot: 2002; Demaizière: 2007; Depover: 2007).

In terms of 'the tutor's role', a teacher is totally substituted/replaced with a computer (in a full sense); while playing 'the tutee's role', a teacher is responsible for the entire didactic process and controls a student's activities at all times. For instance, a range of off-line language courses (referring to linguisitic competence checked by means of points granted) during which a student 'cooperates' only with selected programmes (mainly available on CD-Rom) but there is a total lack of real or virtual contact with a teacher.

In the case of 'the role of a tool', multimedia aids available on/off-line become a selection of many tools that support the learning/teaching process. In this role, there is a spectrum of computer-IT products, such as tools for general users (e.g. text editors, websites, etc.), didactic tools able to be

[1] According to Wikipedia there is a numer of the most frequently used CAT tools, such as Trados, Wordfast, memoQ, OmegaT (http://pl.wikipedia.org/wiki/T%C5%82umaczenie_przy_u%C5%BCyciu_komputera) while translation market recommends also Deja Vu, SDLX, Systran as tools that support a translator.

grouped as tailored education tools (e.g. language games, multimedia encyclopedias, etc.) and tools that provide the teacher with the possibility to prepare their own multimedia aids (e.g. an author'`s systems, generators of language exercises, e-learning platforms, etc.). The latter refers to special situations in which a student controls the selected programmme/computer system, which is very rare in the field of foreign language education (Levy: 1997).

The above classification is based on Taylor's who started to use it in the 1980s. According to some scientists, Taylor's classification does not present all the potential uses of technological tools able to be implemented during foreign language lessons. Mangenot (1996, 2002), for example, proposes two extra roles that could enrich Taylor`s classification. He claims that nowadays such tools are becoming more important than ever before. In accordance with Mangenot`s idea, the following could also be included :

a) the role of multi- and hyper-media sources (emphasising the specificity of these tools and their differences in comparison to traditional didactic means),

b) the role of the didactic environment (combining all the abovementioned roles).

Even if there is a group of scientists who cannot decide which of those roles should be treated as the best in the field of new technologies in the foreign language learning/teaching process (Levy, 1997; Mangenot, 2002). The majority of scientists agree that those roles, to some extent, depending on the teacher-student realtionship as well as the didactic context, should be involved in the education process. According to Bertin (2001) and Vincent (2002), owing to the specifity of new technologies (motivation, individualisation, autonomisation of the learning process, stimulation of studying, diversity of techniques involved in the presenting of material, etc.) as well as the natural need for their presence in every situation in the life of the modern generation of pupils/students, new technologies not only can but should also become an integral part of the modern teacher's workplace.

2. THE KEY ROLE OF UNIVERSITIES

Universities play a key role in providing students with strategies and competences allowing them to be part of the current information society. As a result, students are able to develop a productive career. Universities are expected to provide academic-level education in accordance with the Bologna Process 2020, the European Higher Education Area (EHEA).

Universities aim to help students cope with a virtual environment and to familiarise students with the university's specific online tools (Gultert and Romeu 2009:1).

In this scenario, the University of Silesia is making strategic decisions about the implementation of the new degrees/subject areas within the framework of the Bologna Process – for achieving digital literacy, the gradual acquisition of Information Computer Technology (ICT) skills.

The role of universities is to foster a wide range of strategies and competences that enable students to pursue a productive career. These competences need to support current studies, enhance future employability as well as provide lifelong learning.

2.1 Digital competence

As early as in 2006, the European Parliament and Council clarified digital competence in the following manner:

> 'Digital competence implies the sure and critical use of Information Society Technologies in working, leisure activities and communication. Mastering ICTs is the precondition: using the computer to obtain, estimate, store, produce, present and exchange information, and to communicate and participate via Internet in collaboration networks.' (Cochard and Rogard 2008: 1)

In the field of new technologies, digital competence was defined by the Commission of the European Communities (CEC): '[d]igital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce and exchange information, and to communicate and participate in collaborative networks via the Internet' (CEC 2005: 16). Then, the digital competence is discussed by Cochard and Rogard (2008: 1) who claim that '[t]he digital competence, the use of ICT tools are essential for the student, the employee and more generally the European citizen in their study, work and life in this 21st century.'

In the Polish education system, referentials of competence and qualification methods were defined by the Ministry for Higher Education.

However, it is not going to be an easy task for education as according to science historian Thomas Kuhn (in Tsantis 2011) it is essential to shift outmoded educational paradigms to ones that are truly appropriate for the 21st century.

2.2 The key role of today's translator

It should be highlighted that ‘contemporary processes of information distribution via processes of translation now rely heavily on new information technologies (IT)’ (House 2009: 79), which affects the today`s translators` main qualifications and competences as the process of translation needs to be extremely fast. According to House (2009: 79) the problem of time pressure may lead to unknown difficulties for the translator; this is why he or she are more frequently supported by ‘[m]achines that can imitate these human translation strategies so there is a kind of “division of labour” between man and machine in computer-assisted translation (CAT)’ since ‘computer programs relieve the human translator of boring and time-consuming routine tasks, and give him or her access to different translation reference works’ (House 2009: 10-11).

Yet it is unlikely that the CAT tools will ever replace the human translator completely. Thus, in the light of IT advances, the role of today`s translator changes and so called *hybrid systems*[2] have emerged. This is why, universities are expected to provide the students with not only linguistic skills but also the professional as well as technical skills. According to Lönnroth[3] (DGT in the EC 2008) a good European translator should acquire a spectrum of key competences:

a) an interpersonal dimension,
b) the mastery of the relevant languages,
c) an intercultural competence,
d) the information-mining competence,
e) thematic competence,
f) technological competence;

Furthermore, the modern translators become *treditors* (who edit and treat texts before translating them), *language detectives* (who try to find what the author might have wanted to say and what are the linguistic and cultural references), *bridge builders* (who are able to understand the cultural and societal context to which the text refers), and *language gardeners* (who can

[2] John Urry calls ‘global hybrids’ are ‘informational systems, automobility, global media, world money, the Internet, healt hazadrs’ (2003: 14)
[3] Karl-Johan Lönnroth *Setting the example in a complex market* (2008), Director-General, Directorate-General for Translation European Commission; conference and debate 'Translation is our Business' in Brussels in 2008;

ensure the correctness of terminology and syntax translating technical, legislative or policy documents) (Lönnroth 2008, 2009[4]).

2.3 The key role of today's teacher

According to Beldarrain (2006: 149) emerging technologies may also affect the role of the teacher who used to be the deliverer of knowledge. The teacher`s role has changed over the years and different responsibilities have emerged. Today, the teacher is rather perceived as being the instructor and facilitator than the one and only source of information. Besides being an instructor, the future teacher may need to be more of a 'partner in learning' than a facilitator. Beldarrain (2006: 149) claims that '[t]he instructor must view the students as contributors of knowledge, and thus allow them to participate in the creation of content.' What is more, 'the instructor's role will include not just monitoring and facilitating the interactions, but also actively participating in the exchange of knowledge and reflection' (Kearsley and Shneiderman 1999).

2.4 The key role of today's graduate

Studying at university level should help meet the needs of the 21st-century student who is technologically savvy, highly mobile, and who must acquire the skills required in the modern workplace. The purposeful and deliberate integration of technology tools will enhance student interaction as well as competition in the labour market. Thus IT plays an important role in shifting outmoded educational paradigms to those that are appropriate for the 21st century.

That is why, graduates must be prepared to deal with global issues which are perceived both as macro issues that 'affect their place in the world' and micro issues that 'affect the quality of their lives' (Tsantis 2011: 2).

3. PRINCIPLES AND EDUCATIONAL PRIORITIES IN THE POLISH EDUCATION SYSTEM

The basic principles of the education system are included in the Education System Act of 1991. Amongst important general principles and objectives, there is one which should be considered in more detail. According to UNESCO, 'adjustment of the direction and content of education to labour market requirements', which is of high importance in the 21st century. What is

[4] Karl-Johan Lönnroth *Launching the EMT Network: Fasten your seatbelts* (2009), Director-General, Directorate-General for Translation European Commission; conference in Brussels 2009

more, the transition towards a market economy in Poland, initiated in 1990 together with the political and social changes required 'a reconstruction of the education system and its adaptation to new social aspirations, needs and patterns.' As a result, in the field of higher education those changes have reinforced education-driven endeavours, focused on a spectrum of disciplines 'in which students and graduates are sought in the labour market.' (UNESCO) This means that higher education plays an essential role to prepare students for full participation in the new European political, social and economic context. The new structure of the education system was fully implemented as of 2004/05.

In view of the above, there is necessity to adapt vocational education to the changing needs of the market economy.

3.1 Higher education – implementation of vocational training at the Silesian University

In line with the requirements of the European Commission (EC) as well as the Bologna process[5], the new Higher Education Act of 27 July, 2005, applying to public and private institutions of higher education was implemented. In this context, universities independently decided on the contents of the curricula, their scope and methods for applying them so as to provide a basis for the implementation of the vocational system. This is why, the Silesian University (SU), particularly the Institute of Romance Languages and Translation Studies (IRLTS), aims at the extension and acquisition of not only general knowledge but also upgrading of vocational skills and qualifications needed for a future job or position as required by the 21st-century labour market. Let us discuss the main objectives of the university's programmes which react to both current local market needs and the European labour market.

3.1.1 Training of Translators

The adaptation of common standards, according to European Comissioner for Multilingualism in 2008, makes the SU introduce new courses so that the

[5] More details about *The Bologna Process 2020-the European Higher Education Area in the New Decade*, Leuven Louvain-la-Neuve Communiqué, can be found on http://www.ond.vlaanderen.be/hogeronderwijs/ Bologna/conference/documents/Leuven_ Louvain-la-Neuve_Communiqué_April_2009.pdf

European institutions can find translators with the competences the future employers require (Pym 2009: 4). According to Lönnroth (DGT) (2008), it should be emphasized that during university translator`s training, both academic staff and trainee translators have to 'move away from paper and pencils as the sole translation tools' and turn towards Translators` Workbench, Translation Memory, electronic transmission of documents, etc., which is significant for both recruited translators and trainee translators who are expected to 'keep abreast of new technologies through specialized training' (Lönnroth (DGT) (2008).

3.1.1.1 Specialized training in the Institute of Romance Languages and Translation Studies

The IRLTS introduced a new course *The computer tools and multimedia in Translation* in 2010 so as to enhance as well as increase the level of advancement amongst FL students and academic staff in using new technologies in translation. The Director of the IRLTS cooperates with *Kilgray Translation Technologies*[6] that offers innovative translation technology to enhance productivity and quality for translators. The cooperation is based on the academic and the training programs supported with the Kilgray Translation Technologies' Academic Programme.

As a result, the academic curriculum and programs in the Institute have been modified and a training takes place in the computer laboratories which are equipped with licensed computer-assisted translation (CAT) tools, such as memoQ, Trados 2009, Wordfast Classic and Wordfast Anywhere. Furthermore, the new course is aimed towards university students who are FL graduates with Bachelor degrees, Master degrees, or who are post-graduate students.

3.1.1.2 The emergence of *hybrid systems*

The new course *The computer tools and multimedia in Translation* aims to support and familiarize the future specialists with new techniques in translation process that are necessary to meet the needs of the labour market. All in all, the participants are expected to acquire and complete their knowledge in the field of CAT programs/tools as well as the topics centred

[6] Kilgray Translation Technologies - Kilgray is the world's fastest growing translation technology vendor. The company was established in 2004 by three Hungarian language technologists. Kilgray spent the first four years working on the technology and made its large-scale debut in 2009. http://kilgray.com/

around segmentation, Translation Memory, placeables, cleaning up after translation, terminology management or quality control functions, which is discussed and practiced within 15, 30, or 60 hours per semester. It is worth mentioning that the participants of the course are able to watch memoQ Training Video Tutorials prepared to show how to create a project, how to translate segments, or how to work with formatting (see Figure 1); also there are training video tutorials on You Tube demonstrating and explaining all the major functions of, for example, Trados 2009, Trados 2010, Wordfast, etc.

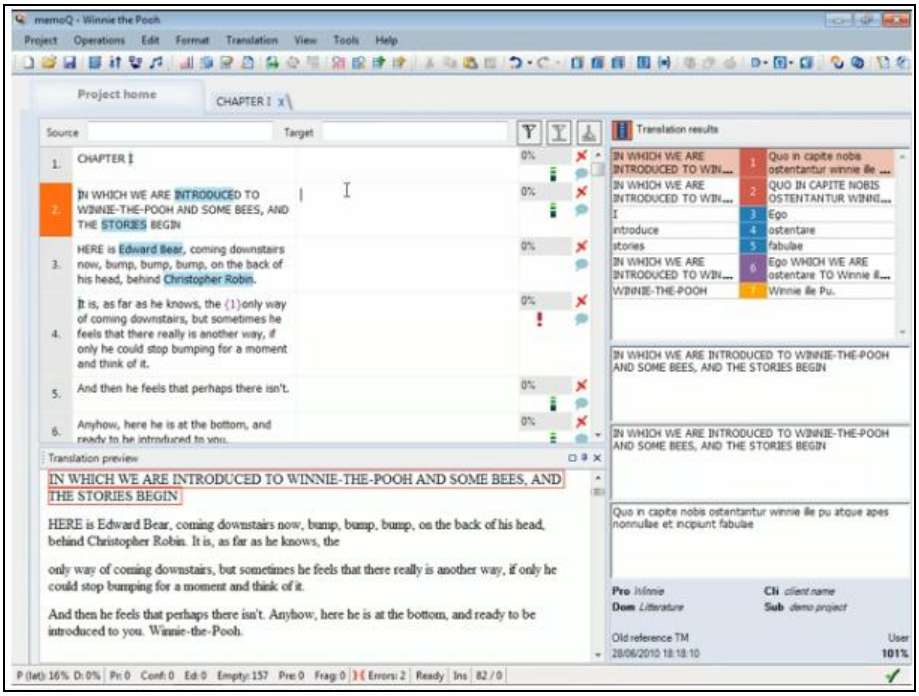

Figure 1. An example of a training video tutorial *Translating segments in memoQ* prepared by Kilgray

Source: http://kilgray.com/resource-center/training-videos/translating-segments-memoq

Furthermore, the course participants are familiarized with a spectrum of CAT programs since there are different preferences in different European translation companies. The professional translators are asked to transfer documents in Source Language into Target Language using tools that are proposed by Translation Agencies with which they cooperate. The diversity of CAT programs makes academic staff provide the students with knowledge about basic icons, interfejs, functions, shortcuts, colours, and other features.

However, in the context of the main objectives of the EMT, during the continuous upgrading of future translators` skills, academic competence and language proficiencies should be combined with the art of two-way translation (Lönnroth 2008). This is why, in the light of their fundamental skills, the course participants have to know that documents should be orthographically, grammatically and stylistically correct. To reach/gain the high-quality translation, the students have to ensure the correctness of terminology and syntax, as a good translation can be ruined with a bad terminology. In this case, the trainee translators practice creating glossaries and Term Bases with memoQ program (one of the most advanced tool in the translation industry), which enables them to place (copy and paste) pictures, graphs, diagrams, tables, etc., frequently copied from visual online dictionaries, in the separate frame in Term Base (see Figure 2).

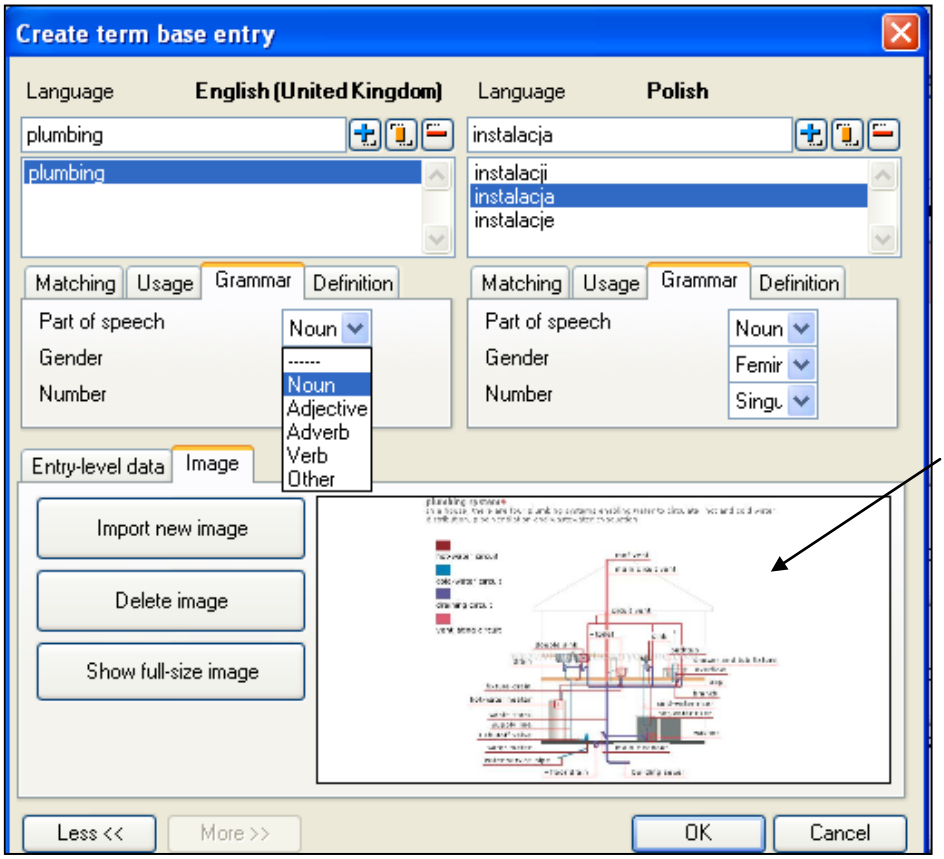

Figure 2. An example of placing a diagram of terminology into Term Base in memoQ programme from online Visual Dictionary

Source: The Visual Dictionary http://www.infovisual.info/05/pano_en.html

To summarise, it is worth noting that memoQ is one of the CAT tools that assists the translator in all the situations described in section 3.1.1.2. Furthermore, it is interesting in the light of memoQ Term Bases that adding terminology is possible before or during the translation process itself. What this distinction implies is the fact that even if the terminology is confusing for translators, the visual representation of data makes the translation process easier to explore, faster and more dynamic.

3.1.2 Training teaching staff

According to EU standards (cf. sections 1 and 1.1), the use of new ICTs in the process of educating trainee teachers is conducted in a two-fold way in the field of philological specialisations at the SU, particularly courses conducted at the Institute of Romance Languages and Translation Studies. On the one hand, the communication/information function of ICT tools is implemented; in this case, students become (more or less active) addreesses of multimedia aids that are adapted to the students` needs on every educational level. On the other hand, future teachers become co-authors and self-makers of multimedia aids adapted to the preferences and real, as well as virtual, needs of students. Academic staff at the SU prepare online didactic materials; support the training and education process and, as a result, the students acquire both communication and didactic competences, particularly specialisations for training teachers.

In terms of the second case, implementation of ICT tools into university curricula supporting the new teacher`s profile aims at crucial function. Generally, this involves informing students about the current offer of didactic tools that could be helpful, if used properly, to support the expected ‘roles’ among modern teachers (cf. section 2.2). This is why trainee teachers should be familiarised with such educational computer tools that provide them with the possibility to prepare, both didactic and technical multimedia aids on their own that can, on the one hand, provide support in the process of preparing students for the new linguistic reality, on the other, they can be appropriate for the students` real linguistic and communicative needs.

These goals are implemented in undergraduate studies for trainee teachers of our Institute and Postgraduate Studies of Pedagogic Preparation for the students of philological departments. These courses are included in the Institute's offer and are prepared for both BA degree and MA degree graduates. Currently, the programme of courses utilising new technologies in the process of foreign language (FL) learning/teaching, enables the future teachers to be familiar with the offer of various educational tools/ aids/ sources/ systems/ etc..

Students are able to learn about ‘closed systems’ (technologically advanced programmes to prepare exercises/language tasks) and 'open systems' (e-learning platforms e.g. the Moodle platform). The aim of the course is both the analysis and evaluation of the selected educational tools/programmes as well as their practical use in specific didactic situations. This analysis is based on three basic didactic features that refer to programmes/tools as well as a type and number of proposed language tasks/ exercises, their character, quality and authenticity that are useful and the interactive feedback of the selected tools/programmes, particularly the characters of received/transferred feedback (cf. Widła, Mrochen, Półtorak: 2010, Półtorak 2011).

There are different criteria that classify the analysed system - both 'closed' and 'open', and the objective evaluation of their educational importance. For instance, taking the interactive level of the computer system into consideration, students are able to become familiar with programmes that offer *retroactive feedback* (specific for e.g. *Hot Potatoes*, *Quandary*, *NetQuiz Pro,* etc.) or *proactive feedback* (specific for e-learning platforms that enable the users to employ a synchronious or asynchronious teacher-student dialogue), *adaptated feedback* or *adaptative feedback, instant feedback* or *suspended feedback*; *behavioral, informative* or *constructionist feedback* (cf. Półtorak, 2009; Półtorak, 2011). Furthermore, it provides the possibility to compare firm and weak features of selected tools/programmes taking into account the analysed criteria. This deep analysis of selected education tools/programmes seem to provide a core section of trainee teachers` education so that they will be able to prepare their own exercises, tasks, lessons or language courses.

In the light of courses, they can take part in different individual or group projects whose aim is to implement their practical competences referring to various didactic situation (contexts) (see Figure 3).

In summary, the modern labour market requires future teachers to deal with a range of challenges. Apart from traditional competences (very good FL competences, both general FL as well as language for special purposes, good didactic and psychological and educational training, etc.). Moreover, the modern teacher should have a full set of core competences in terms of using and operating new technologies in the FL teaching/learning process. This is why the process of implementing these competences into university curricula prepared for future teachers is of high importance and fulfill the standards that are required at university level. Above all, this process aims to help and support future teachers in a real way so as to fulfill the expectations of students and potential employers.

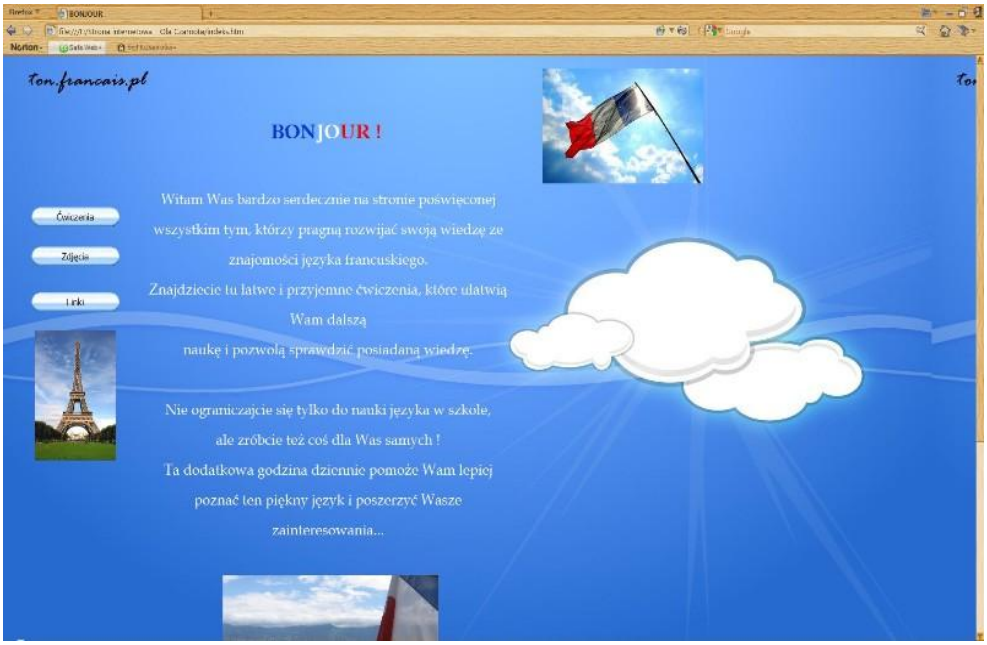

Figure 3: An example of the website designed to support the learning process of French at primary level

Source: dr Ewa Półtorak`s training visual aids

3.1.3 Graduates – adjusting vocational skills

The Silesian University in Katowice is involved in *University as a partner of the knowledge economy* (UPGOW) project. According to the priorities set out in the Human Capital Operational Programme, Action 4.1.1 *Strengthening university educational capacity* as well as the Development Programme of the SU for 2008-2015, the main aim of the UPGOW project is making education process more popular and useful at every stage of studying (Smyrnova-Trybulska *et al*. 2009: 102). This is why, the SU facilitates the process of education by means of e.g. offering new studying specialities or modifying those that have been offered so far. In line with these activities, graduates gain an education and training in accordance with the needs of labour market.

3.1.3.1 The Moodle platform and the UPGOW project

One of the activites of UPGOW project focuses on preparing didactic materials and education programmes utilising methods and distance learning techniques on the Moodle platform (http://el.us.edu.pl/upgow/). According to the general goals of the project, as many as 69 distant course modules based on topics included in the prepared programmes will be accessible on the

Moodle platform by 2012. What is more, these modules will support students during lectures providing them with the opportunity to broaden knowledge and check new information in an interactive manner (Widła, Mrochen, Półtorak 2010).

3.1.3.2 Characteristics of the UPGOW project

E-learning market in Polish and abroad is developing very dynamically and changes the system of education nowadays provide university graduates the possibility familiarise themselves with e-learning. This is why, the main goal of courses on the UPGOW platform is to persuade students to broaden their knowledge utilising distance learning methods and techniques.

There is a wide range of didactic aids available such as HTML page, link, lesson, book, dictionary, quiz, task, audio files, video, PDF text files, multimedia presentations, etc.). As a result, these distant courses are offered in an attractive way as they are accompanied by numerous audiovisual didactic materials, such as images and graphs.

In addition, the contents of the distance courses is prepared with the cooperation of experts in many scientific fields who are employed in different departments at the SU, such as the Faculty of Geology, the Faculty of Mathematics, Physics and Chemistry, the Faculty of Biology and Environmental Protection, the Faculty of Computer Science and Science of Materials, the Institute of Arts and the Study of Practical Science of Foreign Languages.

The diversity of the educational contents of the courses can be also perceived as the source of interesting technical inventions. In essence, the structure of an e-learning course prepared by the academic staff of the Faculty of Geology.

3.1.3.3 Structure of a course on the UPGOW platform

A set of examples of the course *Metal ore deposits – their origin and role in the development of civilisation* are illustrated in this section. This distance course was launched in 2010 and was evaluated very highly and regarded as a well-prepared course not only in terms of factual knowledge but also methodology. Thus, it is available to the users of the platform.

The course's home page (see Figure 4) includes a video inviting users to participate in the distance course and a list of contents is available in the left margin. The given platform structure provides the possibility to present topics/issues at any order.

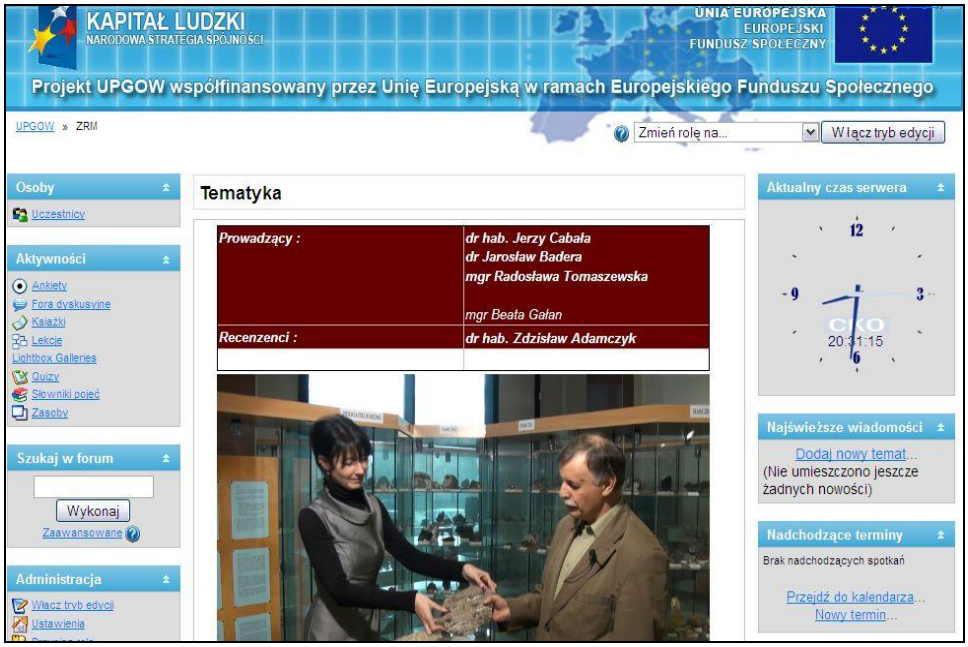

Figure 4: Video material – an invitation to the *Metal ore deposits – their origin and role in the development of civilization* course (the Faculty of Geology). *Source: http://el.us.edu.pl/upgow*

It is important to note that each topic/problem of the distance course contains a text file presented in the form of a book (see Figure 5) or a lesson (see Figure 6), which is an equivalent of a traditional university lecture.

The test files placed on the platform are able to be accessed by students many times; therefore, students by themselves, may decide which part is the most interesting when choosing the appropriate *frame.*

Apart from text files placed on the platform (PDFs, websites, multimedia presentations) a distance course contains a wide spectrum of possible quizzes providing users with the possibility to check their knowledge in an interactive manner, making it more attractive than traditional methods of evaluation.

The set of questions included in the quiz may be diversified, e.g. 'test questions', 'a short answer', 'mathematical questions', 'match the answer questions', etc., entirely dependent on the course-author's choice. Moreover, a distance course includes a range of reference books and extra materials (e.g. text files, multimedia presentations, useful links) that are suitable for users to broaden their interests. In particular, this may include a glossary containing useful definitions in the chosen discipline.

Figure 5: A section of a book on using metals (*Metal ore deposits – their origin and role in civilization development*).

Source: http://el.us.edu.pl/upgow

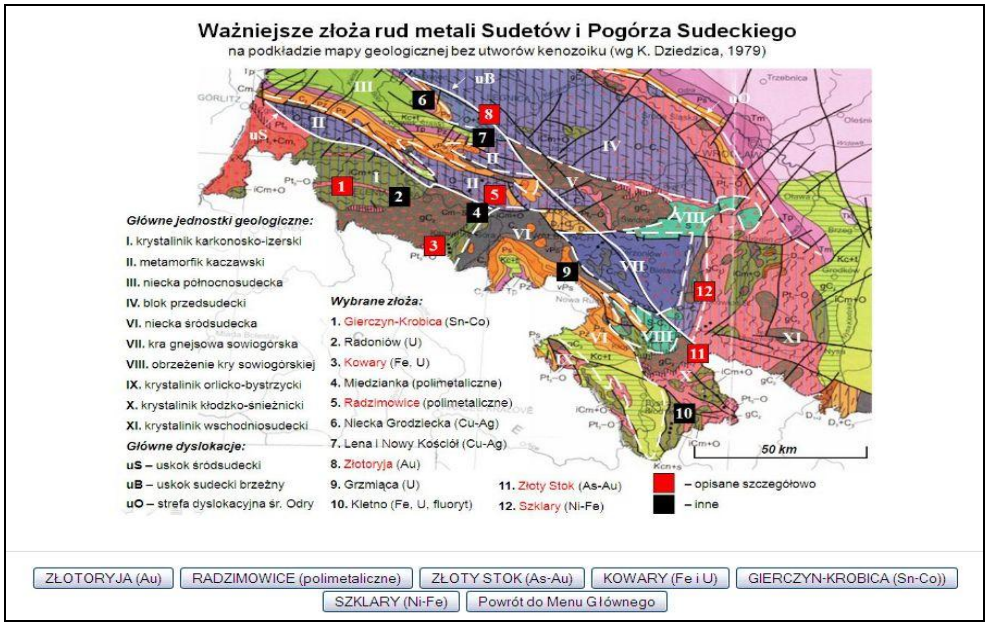

Figure 6: A section of a lesson on *Metal ore deposits in Poland*

Source: http://el.us.edu.pl/upgow

However, owing to the limited scope of this article, it is only possible to present a small selection of what distance courses can offer. The overall objective of this section is to provide an illustration as to how an interactive manner of organising distance courses surpasses traditional university textbooks.

In summary, it is worth noting that the resources available on the UPGOW project's Moodle platform encourage students to broaden their knowledge (theoretical and practical) by means of learning how an e-learning platform functions and how to use it most effectively. Understanding how to use e-learning platforms improves the qualifications of graduates and enables them to gain favourable employment. Furthermore, resources placed on an e-learning platform play an important role in persuading students to study beyond the strict confines of the university curriculum. This particular point is directly in agreement with one of the purposes of the Bologna Process in promoting the idea of life-long learning.

CONCLUSION

In the light of using new technologies at university, vocational training plays an important role confronted with the needs of modern European economy and requirements which are imposed on university graduates by potential employers.

To meet the EU university standards, the Silesian University gives the students the possibilities to know a range of tools that can support future teachers as well as translators in their workplace. During practical activities, the students can learn and analyse not only computer-assisted programmes (CAT) but also didactic programmes. Furthermore, the users can take part in a wide spectrum of distance courses available on the SU Moodle platform, which enables the course attendants to broaden their knowledge in the selected scientific fields and learn how an e-learning platform should be operated.

It should be emphasized that ability to cope with modern tools in the workplace improves the university graduates` qualifications and has a vital contribution to creative and innovative development of the higher education institutions. The aim is to prepare students for their future careers, create and maintain a broad as well as advanced knowledge base.

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SHAPING KEY COMPETENCES IN LANGUAGE CLASSES – ON THE IMPLEMENTATION OF E-LEARNING IN MIDDLE SCHOOL FOREIGN LANGUAGE EDUCATION

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Abstract*: Key Competences for Lifelong Learning have become an important aspect of contemporary foreign language education. The development of didactic materials that would enable teachers to promote key competences is a vital issue to be reflected upon. The purpose of the present paper is to present the process of development of competence-building e-learning course for middle school students, e-Academy of the Future. Special focus will be devoted to the way e-learning units are designed, as well as to the teacher's role in the facilitation of materials. The paper is illustrated with screenshots of activities.*

Keywords: key competences for lifelong learning, e-learning, interdisciplinary teaching, Content and Language Integrated Learning.

INTRODUCTION

In contemporary language education the importance of integration of language learning and content does not have to be justified. Long tradition of interdisciplinary teaching, exemplified by such approaches as Languages Across the Curriculum (LAC) or Content and Language Integrated Learning (CLIL) have paved the way for using various disciplines as a source of materials for foreign language instruction. The recent idea of Key

Competences for Lifelong Learning, introduced by *Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning* (2006/962/WE), opens interesting opportunities for designing curricula and materials for the foreign language classroom.

The implementation of e-learning in provision of self-study materials for the development of key competences in language education is a relatively new issue, and one of the few comprehensive projects of this kind is *e-Academy of the Future*, run by Wydawnictwa Szkolne i Pedagogiczne and co-financed from the European Social Fund within the framework of Human Capital Operational Programme 2007-2013, Subaction 3.3.4. The present paper will reflect on the experience of creating competence-building e-learning materials from the point of the view of the authors within this project.

1. INTERDISCIPLINARY TEACHING IN THE CONTEMPORARY SCHOOL FRAMEWORK – THE "NEW" CORE CURRICULUM AND KEY COMPETENCES FOR LIFELONG LEARNING

Key competences, defined in *Recommendation* (2006) as a combination of knowledge, abilities and attitudes relevant to given situations (Okońska-Walkowicz, 2009), are necessary for pupils for personal development, as well as social integration and employment. According to the *Recommendation*, "initial education and training offers all young people the means to develop the key competences to a level that equips them for adult life, and which forms a basis for further learning and working life" (p.11). Key competences are equally important and interrelated since the abilities related to one support the abilities pertaining to the other. *Recommendation* (2006) defines eight key competences:

1) communication in the mother tongue,
2) communication in foreign languages,
3) mathematical competence and basic competences in science and technology,
4) digital competence,
5) learning to learn,
6) social and civic competences,
7) sense of initiative and entrepreneurship,
8) cultural awareness and expression.

The description of each competence embraces its definition, along with the knowledge, abilities, and attitudes related to it. *Recommendation* also features a shift of attitude to spreading knowledge. According to Okońska-Walkowicz, Plebańska and Szaleniec (2009), shaping the attitudes suggested in *Recommendation* requires that schools go beyond the scheme: assigned - learnt - checked. As Okońska-Walkowicz et al. (2009) add, "pupils have to be confronted with several problematic contexts, which they will solve by themselves, perfecting the abilities and developing the expected attitudes" (p.17). In the foreign language teaching process, this means, for instance, pupils' involvement in formulating grammar rules, guessing the meaning of unfamiliar words on the basis of situational or lexical contexts, and choosing the situation-adequate strategies of learning.

The "new" core curriculum, in use since the academic year 2009/2010, defines what schools are supposed to teach average pupils on each stage of education (Marciniak 2008), at the same time encouraging the extension of learning content and facilitating the transition from middle schools to high schools. As Szpotowicz (2009) claims, the curriculum promotes the effects of teaching, instead of focusing on the very process, and fulfills the communicative competence definition described in the *Common European Framework of Reference for Languages* (2001). The current core curriculum does not refer directly to the category of key competences; however, its implementation in the middle school simultaneously develops key competences. For instance, as Okońska-Walkowicz et al. (2009) claim, reading is an element of communication in the mother tongue and communication in foreign languages, while mathematical competence and basic competences in science and technology embrace using the processes of making logical conclusions when formulating grammar rules. Another example may be digital competence and learning to learn, which constitute indispensable components of the strategic inventory of pupils at each stage of education. Szpotowicz (2009) points to the significance of giving pupils access to various sources of information and enabling their use, which entails learning how to use foreign-language multimedia dictionaries, illustrated encyclopedias or Internet resources.

According to the core curriculum, pupils are supposed to be provided conditions necessary for self-evaluation, and they should be able to use techniques of autonomous work upon language (using dictionaries, correcting errors, remembering new lexical items), to use IT tools, to search and process information sources in a foreign language, and to have constant access to authentic materials, to native speakers, and to international exchange projects (Krajka, 2011).

It is also worth noting that the new core curriculum's focus on shaping key competences is a follow-up to the well-established foreign language didactics traditions, aiming at integrating language education and content (C*ontent-Based Instruction, Languages Across the Curriculum, Content and Language Integrated Learning* – see Brinton et al., 1989; Stryker and Leaver, 1997; Masih, 1999; Marsh, 2001; Marsh et al., 2001; Deller and Price, 2007; Coyle, 2006, to name just a few). This time, however, competence listings no longer include rigid sets of topics which teachers had to implement in their classes, as was the case with interdisciplinary streaming in the "old" Core Curriculum before 2009. Key competences not only are better suited to everyday life reality but they also give teachers more freedom to discuss the most essential aspects of various contexts, be it ecology, history, or a foreign language; and this also includes the ability of matching the content to the context of a given school type.

2. DEVELOPING KEY COMPETENCES OF MIDDLE SCHOOL STUDENTS IN E-LEARNING – OUTLINE OF THE PROJECT

The three-year-long project *e-Academy of the Future* (*e-Akademia Przyszłości*), which aims at shaping key competences, engages 200 selected middle schools in Poland, 1,500 teachers, and 15,000 pupils starting school in the school year 2010-2011. The interdisciplinary program, co-financed by the EU as a part of the European Social Fund, uses blended learning and project work methods; for this purpose, there has been launched an e-learning platform hosting all the project-related materials (e-learning units, tests, lesson scenarios, home assignments, and IM communicators - Okońska-Walkowicz 2009). Schools and teachers have been equipped with necessary resources such as interactive whiteboards and netbooks for successful implementation of the materials. Both teachers and pupils can use the platform in and outside the school: one of the key objectives of the project is to enable individualized work for skilled pupils (through virtual academic circles) and support weaker pupils, i.e. those who graduated from primary schools with lowest scores (through compensatory groups).

Out of the 21 e-learning units planned for English for implementation in 2010-2012 each thematical unit focuses on one key competence, at the same time embracing, to a lesser extent, selected other ones. This approach to competence-oriented e-learning materials can be exemplified by one of the first themes, *The Phenomenon of J.K. Rowling*. The unit has language aims (practising spelling, learning the rules of capital letter use in English, becoming familiar with the notion of synonymy) and competence aims

(communication in the mother tongue: sensitising students to the rules of capital letter use in the mother tongue and in the target language, developing the ability to distinguish common nouns and proper nouns).

The unit, spanning a 45-minute period of student's self-study or in-class use, is subdivided into Lesson, Practice and Test modules. The first two encompass a series of self-study activities of multiple types (text and picture matching, fill-in-the-blanks, matrix of choices, drop-down menu choices, error correction, reordering, and many others), which are aimed at integrating language and competence contents, within all the three areas of knowledge, skills and attitudes. According to the principles of contemporary foreign language methodology, each unit follows a balanced syllabus, integrating fluency and accuracy focus, grammar and vocabulary instruction, receptive and productive skills. In this way, it is hoped learners get a well-developed course catering for all their language needs taking as its contents topics related to components of key competences.

Figure 1. The Phenomenon of J.K. Rowling – posing the problem of synonymy and capital letter use as introduction to the learning unit.
Source: e-Akademia Przyszłości, http://www.e-akademia.eduportal.pl/

e-Learning units revolve around such topics as ecology (*Being Green*), teenage idols (*The Phenomenon of J.K. Rowling*), fads (*21st-Century Dieting*), sports (*Doing Sports around the World*), professional and educational opportunities (*Learning Likes and Dislikes*, *How Come This Thing Doesn't Work*, *Do You Want to Have an Interesting Future Job?*), the Internet (*Cyber-vandalism in Wikipedia*, *Love Recovered Through Facebook*) or culture (*Do You Want to Go to London?*). Usually, there is a central idea to the whole unit, which binds the contents together. This is later implemented in a storyline of screens with animated exchanges between characters – a student of English, students of other subjects (coming from e-learning units of, for instance, mathematics or physics), their mothers, fathers, friends, as well as "outside world" characters (a postman, a policeman, a tour guide, etc.). The interaction of Avatars is interspersed with activity screens, these serve as pre-reading or pre-listening, enable students to conclude on the text they have just read or listened to, activate their schemata or create context.

Figure 2. A sample interaction screen introducing learning styles diagnosis from *Learning Likes and Dislikes* e-learning unit, featuring English language Avatar (centre, with a laptop) and his friends.
Source: e-Akademia Przyszłości, http://www.e-akademia.eduportal.pl/.

By definition, e-learning units do not require teachers' presence in the assessment process. Thus, the course contains quizzes with predefined

answers, based on various question formats (multiple choice, matching, drag & drop, gap filling) and divided, in terms of participants' access to scores, feedback, and answers, into learning and teaching quizzes. Their distribution is related to the unit structure. In Lesson and Practice parts pupils may attempt quizzes an unlimited number of times; each attempt at each quiz concludes with feedback and scores displayed. On the other hand, in the Test part, pupils get access to feedback and scores only after completing the whole set of tasks: the test part, as its name implies, functions as a part of summative assessment (contrary to the first two formative unit parts).

3. DESIGNING COMPETENCE-ORIENTED LANGUAGE MATERIALS FOR E-LEARNING

The process of designing competence-oriented e-learning materials will be exemplified below by one of the units of *e-Academy of the Future*, namely *Cyber-vandalism in Wikipedia*.

Step 1. Specification of competence objectives

The starting point for the development process is analysis of the competence as specified in the *Recommendation* (2006), selection of major focus (knowledge, skills or attitudes) and isolation of a particular statement for expansion in a lesson. In case of *Cyber-vandalism in Wikipedia*, the decision was to deal with knowledge and attitudes related to digital competence, and to expand the following notion:

> Digital competence requires a sound understanding and knowledge of the nature, role and opportunities of IST in everyday contexts: in personal and social life ... Individuals should ... be aware of issues around the validity and reliability of information available and of the legal and ethical principles involved in the interactive use of IST. (*Recommendation*, 2006, pp. 15-16)

Thus, the reliability of online sources, in particular encyclopedias such as *Wikipedia*, ethical issues involved in the interactive use of Information Technology and Internet crimes were the specific competence contents of the unit.

Step 2. Matching Core Curriculum objectives

The second essential step is to reflect on which of the abilities specified in the Core Curriculum will be practised in the unit – which of the language skills (receptive, productive), which specific achievements (e.g., listening for gist, reading for details). In this very unit, students were supposed to develop the

ability to read and complete a gapped biography, read the press article for true/false statements and listen to a radio interview for details.

Step 3. Specification of language content

After the specification of competence objectives, matching of language contents is to be done. In this very case, vocabulary related to Internet crimes, the genres of a biography and radio interview, as well as grammar structures of passive voice and relative clauses were to be integrated in the unit.

Step 4. Storyline design

As the materials in each unit are to be bound by a common topic and story involving avatars, the crucial step is to determine the events that avatars interact in to preview activities and introduce tasks. Here, it was decided that avatars will be cyber-detectives spotting particular Internet crimes and trying to combat them. Figures 3 and 4 below show a script for two interaction screens building the story and creating dramatised context for language work.

Bureau for Fighting Cyber-vandalism

Looks like a detective office: a room with two desks, computers, a filecase, a clock on the wall. All in the air of mystery. Glazed door with the notice that reads CYBER-DETECTIVES.

Two characters – he-Avatar and she-Avatar

He-Avatar is a detective working in the office.

She-Avatar comes to the office to find employment there.

He-Avatar: What can I do for you?

She-Avatar: Someone told me that you are looking for new employees. I am a victim of cyber-vandalism and I really want to fight with it. I want to work in your office.

He-Avatar: What happened to you?

She-Avatar: I failed my test at school because I used the information from *Wikipedia*. It turned out that someone put false facts there. I would like to

find this vandal!

He-Avatar: OK, then. Your first task will be to find this person who keeps writing and uploading this crap on *Wikipedia*.

Figure 3. A script for a storyline screen from *Cyber-vandalism in Wikipedia* (greyed areas are notes for software developer).

Bureau for Fighting Cyber-vandalism

Looks like a detective office: a room with two desks, computers, a filecase, a clock on the wall. All in the air of mystery. Glazed door with the notice that reads CYBER-DETECTIVES.

He-Avatar Cyber-detective, She-Avatar newly-hired detective and a new he-Avatar.

New he-Avatar: Hello, I've come here to ask for help.

She-Avatar: Yes?

He-Avatar/client: Someone keeps sending me tons of spam messages to my mailing list. I cannot work as my box is full all the time. I am also afraid that there are viruses in these messages.

He-Avatar/Cyber-detective: Let's see what we can do in this matter. We have a new, very promising agent.

The client leaves the office.

He-Avatar speaks to she-Avatar: If you want to work in my office, you have to know the names of cyber-crimes. Let's check.

The picture is blacked out. The big sign appears in the middle of the screen:

WHAT IS CYBER-VANDALISM?

Figure 4. A script for a storyline screen from *Cyber-vandalism in Wikipedia* (greyed areas are notes for software developer).

In a similar fashion, the storyline is continued throughout the unit, and dramatisation screens are interspersed with language activity screens. Dramatisations serve the purpose of making the whole unit more appealing graphically and thematically, creating the context for subsequent reading or

listening tasks, activating students' schemata and triggering learners' interest in the materials.

Step 5. Activity design

The final step performed by the author is activity design. This crucial stage can be subdivided into two sub-phases – in the first one, the author prepares language activities (collects words and definitions for a matching task, writes texts for true/false or multiple-choice reading comprehension, sentences for jumbled sentence task, etc.) using the language material specified in Step 3 and addressing curricular objectives specified in Step 2 above. Once this rough material is ready in a document file, the author takes very detailed templates provided by the software developer and inserts materials into these, adding instructions, feedback messages, implementation notes, describing graphic resources to be used as illustration etc.

Step 6. Reviewing, editing, redrafting, software development

Further stages operate cyclically one after another and are repeated numerous times until the final product is ready:

1. editing, followed by author redrafting and approval,
2. software standardisation, followed by author redrafting and approval,
3. language editing and reviewing, followed by author redrafting and approval,
4. software developing, followed by author redrafting and approval.

These four stages follow each other, not necessarily in the linear order represented above, to complete the e-learning unit.

4. TEACHERS' ROLE IN FACILITATING E-LEARNING MATERIALS IN COMPETENCE-BUILDING PROCESS

Blended learning is a handy solution in terms of individualizing the process of learning a foreign language (English, in this case) in middle schools. The use of computers and interactive whiteboards, as well as the sense of belonging to Internet communities, makes learning English more attractive and modern. The individualization also stems from matching the thematic content with pupils' needs and interests, not only educational but also social and emotional (Gadomska, Morusiewicz, Krajka 2011).

Using the e-learning platform with competence-oriented materials means teachers' involvement in the facilitation of materials for students. On the one

hand, motivating students to use e-learning units out-of-class, in a self-study mode, is a primary responsibility of the instructor. Training students in particular task types, introducing and reinforcing grammar points from the units, using class time to organise feedback sessions on selected computer-based materials or implementing communicative follow-up activities that take input from the e-learning unit as a starting point are all activities that serve the purpose of maximising students' learning experience and provide proper integration of online materials and class work.

The second very important mode of use of e-learning materials from *e-Academy of the Future* is showing selected parts of units in class in the whole-class mode for presentation or practice of particular points. This can be done either before students start working with the materials individually, as a kind of preview to the unit, or, on the contrary, during or after the unit has been completed in order to further reinforce the material. Here, the teacher facilitates and individualises the learning process by selecting particular screens and activities to be displayed and adapting modes of work (whole class, pair work, group work, individual work, rotating access) to suit the needs of the class. With the use of Interactive Whiteboards that are an essential component of the project in cooperating schools, the teacher manipulates with the presentation modes and grasps students' attention with some of the following IWB tools and functionalities (Możejko, Krajka 2011):

1. Selecting tool to select an object or an area on the screen;
2. Zoom tool, which allows the user to zoom in/out/full a desired object;
3. Pen tool, which makes the color palette active, and allows writing or drawing in digital ink, filling shapes with colour, drawing lines to match items;
4. Highlighter tool to highlight an area of the screen with translucent ink for emphasis without overwriting the object;
5. Line tool to create arrows that can be turned into an object and easily moved around;
6. Eraser tool, which allows the user to erase digital ink, erase parts of the page, wrong answers or clear a box to reveal the answer;
7. Shape tool to make different shapes that can be selected, moved, and resized;
8. Text tool, an open text box for easy writing and editing, adding text, typing or handwriting, encircling or underlying answers.

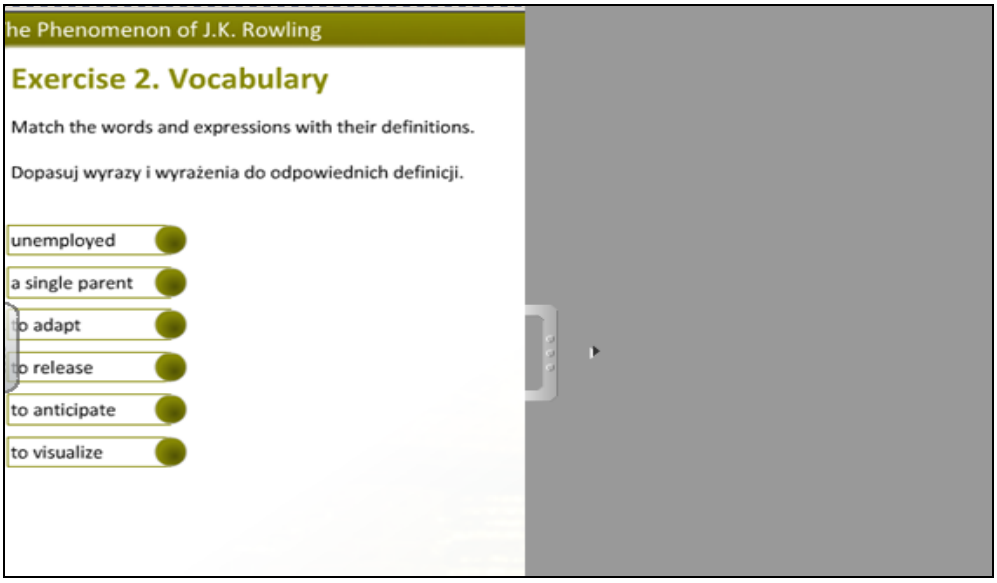

Figure 5. Using Blind tool from IWB software to adapt a sample activity from the e-learning unit *The Phenomenon of J.K. Rowling*.
Source: e-Akademia Przyszłości, http://www.e-akademia.eduportal.pl/

The third mode of facilitation of digital materials developed for *e-Academy of the Future* project is the use of a dedicated e-learning platform to create unique learning paths for given classes. Here teachers are free to move and modify the e-learning unit elements that are too difficult (or too easy) for pupils. Since the e-learning group structure is the same as in the schools, teachers may shape the tasks to a given group's needs, the knowledge of which can be gained on the basis of not only class meetings but also activity reports. Teachers can publish assignments and tests, developing or consolidating the content introduced in the e-learning units and / or during class meetings.

CONCLUSION

The implementation of key competences in language education poses a number of challenges for the teacher. One of them is the need to design language materials appropriately to suit the specification of knowledge, skills and attitudes of particular competences as described in *Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning* (2006/962/WE). This challenge becomes even greater if one thinks about developing digital materials for e-learning.

The present chapter has attempted to illustrate the process of development and in-class facilitation of e-learning materials destined for middle school

students. The e-learning units aim at developing elements of key competences through presenting interactions of digital characters as well as engaging learners in a number of language activities. When combined with in-class instruction either preceding or following the use of e-learning materials, the whole enterprise is bound to provide language learners with a rich linguistic and competence-oriented experience.

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PEDAGOGICAL – DIDACTIC ASPECTS OF E-LEARNING

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Abstract: *The implementation of information-communication technologies is also reflected in the change of ways and strategies of education. E-learning represents one of them. This article is about chosen pedagogic-didactic aspects in relation to e-learning. It is about complementarity of educational theories, requirements for working out of e-learning courses and some problems which are connected with e-learning.*

Keywords: e-learning, theories of education, pedagogic-didactic aspects.

INTRODUCTION

Globalization and computerization are the key phenomena in the society of the 20th and 21st centuries. The traditional society has changed and it is constantly changing under the influence of information revolution, media, geography of cyberspace, virtual reality, Internet and web. Radical changes in media and technologies opened the space for the revival of M. Mc Luhan's ideas who has introduced the picture of „a global village", the world connection through electronic media (McLuhan 1987, p. 7). The society has opened. Scientists do not talk only about the information revolution but also about the planetary evolution. If we think that the quality of the society is given by the quality of mind and understanding demonstrated in consciousness and mental operations of individuals as well as it is given by social conditions for their existence and development, then by computerization people with their activities have entered the main line of the planetary evolution representing the development of human intellect. It is possible that the mankind has come to the cut-off point which will change the trajectory of its development (Sak 2007, p. 27). Man, civilization and social systems are being changed into a shape which is compatible with information

and communication technologies. And this humane and social aspects of computerization is perhaps more important than its technical aspect. Informatization "is not about a computer anymore but it is a way of life" (Negroponte 2001, p. 9). The ability of the civilization to discover new information has increased and caused that the artificial (virtual) reality is being created. As a result of this, cyberspace as a product of the human civilization has originated together with natural space-time. J. P. Barlow (1996) referring to cyberspace wrote: "Our world is nowhere and everywhere, but it is not a space where bodies live. We are building a world which can be entered by everyone - without privileges or prejudice, either racial, economic, military or geographical." As to the quality, cyberspace represents a new phenomenon, it creates new situations, it has a planetary dimension, its participants can actively choose information sources, express opinions and add additional information. Shared information, ideas and communication are creating a source of potential planetary consciousness (Sak 2007: 33). These facts are becoming a part of our everyday life. Are we prepared for them sufficiently? Can we see their complex and far-reaching meaning? Can we accept qualitative changes brought in all areas of life and thus also in education?

1. E-LEARNING

As to the Slovak educational system, present times are bringing the transformation of the traditional school to the modern one which is focused on future investments also into education. We can say that the "digital time educates a digital generation" and under the influence of the "planetary evolution" "a planetary man" is being formed. Therefore we ask many questions. Is the school prepared for such a change, not only quantitative but mainly qualitative? Do we realize that it is the education of a planetary man? Do teachers accept this situation in general or is there only a small group of enthusiasts, "e-teachers" who can accept it? Therefore as the teacher's traditional role is changing, it is also changing the way of education mainly under the influence of ICT. The way of education begins to differ from the traditional way which was given by the specific location, time, age, and class system. It is complemented by new possibilities and e-learning is one of them. Of course, we should take into consideration all the specificities as to the age of pupils and students and the level of receiving education, etc.

1.1 The priorities of educational policy and e-learning

In the framework of educational policy at national, international and European levels, the implementation of ICT into education has become a priority. The European Union has accepted strategic documents relating to

ICT and e-learning. In 2000 EU passed the document eEurope 2002 which was followed by the eEurope 2005. E-learning is taken as a major priority in both of them which was reflected in The eLearning Action Plan from 2001. In 2005 the European Foundation for Quality in eLearning EFQUEL (European Foundation for Quality in eLearning) was founded, which has its headquarters in Brussels. It connects more than 60 organizations, e.g. the European Institute for eLearning, the European Schoolnet, FIM Newlearning etc.). Its aims are to support the development and diversity of e-learning in education, training and learning, to support the exchange of experience as to the quality of e-learning, to provide the infrastructure for improving the quality of e-learning, to generalize the experience and results obtained in research of e-learning and to work out and manage the European projects in e-learning. It founded EFQUEL for creating a database and providing services in e-learning and EQO (European Quality Observatory). The e-learning encyclopedia - Qualitypedia based on Wikipedia is being created (www.qualityfoundation.org / quality-wiki). International standards of the quality of e-learning ISO / IEC 19796-1: 2005, Information Technology - Learning, Teaching and Training - Quality Management - Provision and Metrics (Training Press Releases, 2007) (Turek 2008, p. 417) are being formed.

The final strategy document is i2010 (A European Information Society for Growth and Employment) which has three priorities: to complete the network of European information space, to invest into the research of information and communication technologies and to upgrade it and to make European information societies accessible. The development of e-learning is also supported by various programmes, such as E-Learning Initiative (2000-2003) and A European eLearning Programme (2004-2006), the latest initiative is The Lifelong Learning Programme 2007-2013, which is the support of lifelong learning as well as of the use of ICT. These documents are available on the European Commission websites (www.ec.europa.eu). (Zounek 2009, p. 277-278), e.g. on the European Commission portal of e-learning (www.elearningeuropa.info), European Network of 26 Countries in the Field of e-Learning – European Schoolnet (www.eun.org), e-learning in Europe – the analysis of the chosen Leonardo da Vinci's projects, The Strategy of Informatization of the Society in the Slovak Republic – The Action Plan i2010 – A European Information Society for Growth and Employment (http://saaic.sk).

1.2 Terminological definition of e-learning

The term e-learning comes from the English language and means electronic learning. The concept was introduced in 1999. H. Dichanz and A. Ernst introduce two possible interpretations of the term of e-learning. They distinguish between the technological-organizational interpretation of the word and the etymological-psychological one. According to the technological-organizational interpretation of this word e-learning is understood as an information and training package for the further intradepartmental staff training offered electronically or via CD-ROMs that is available independently of place and time. The etymological-psychological interpretation is based on the own conception of the term e-learning which can mean: Easy Learning, Effective learning, Entertaining learning, Elaborated learning, Electronic learning (Dichanz, Ernst 2001, p. 4).

It does not have a fixed equivalent in the Slovak language but we can meet the terms of electronic learning, electronic teaching or mostly education by ICT. In the English language there are related terms, e.g. WBL - web-based learning (learning via webs), CBT - Computer Based Training (training via computers), ¬ CBI - Computer Based Instruction, CAL - Computer Assisted Learning (learning supported by computers), CAI - Computer Assisted Instruction (teaching supported by computers) (Turek 2008, p. 412).

The differences in a terminology are transferred to the heterogeneity in the definition of e-learning. In technical literature we can meet with more options. Technologically oriented definitions present it as learning provided by interactive electronic technologies, such as the Internet (e-mail, web pages, electronic conferences) and computer technologies (the computer is the main source of learning) (Beetham 2002). According to Kopecky it is understood as a "multimedia support of the learning process in which modern information and communication technologies are used and it is usually realized through computer networks. Its main role is to have a free and unlimited access to education in time and space." (Kopecky 2006, p. 7). According to another view it is as a way of learning in which the knowledge acquisition and the use of knowledge are distributed and facilitated by electronic devices. It is still being developed and it is using various information channels (radio, television, satellite). E-learning can include complex learning courses, smaller learning modules or sub-topics. It can be distributed from the sources which are geographically and time independent, in terms of time synchronous or asynchronous (Wentling et. al. 2000, Meyen 2002, in Sak 2007). So e-learning can be done by computer (Internet, intranet, CD ROM, DVD etc.), television (cable, satellite

transmission), audios and videos or mobile phones. According to the method of a computer connection to the network, we distinguish two types of e-learning:

1 off-line education – a student is not connected to a computer network and the teaching materials are available on CDs or DVDs,
2 online education – a student is connected to a network (Internet, intranet) and the teaching materials are distributed through network media.

In terms of the way of communication between the student, the curriculum and the tutor, we distinguish:

2a) synchronous communication (teaching) – students are in the contact with the teacher and with other students through video conferences, chatting, interactive communication or virtual classes. They can communicate from different locations.

2b) asynchronous communication (learning) - students work independently through information and communication technologies. They are not studying at the same time, they are studying through the websites, CD-ROMs, DVDs, e-mail, webblogs, etc. (Turek 2008, p. 414).

2. PEDAGOGICAL – DIDACTIC ASPECTS OF E-LEARNING

The 21st century has opened the era of a super symbolical communication which is characterized by the rapid penetration of ICT into all areas of life of the society, education and school system. It brings the possibilities of the quick communication between people and it does not depend on the location and time (Zacharová 2010, p.13). Speed, dynamics and progressiveness is reflected in the stream of information flowing. When in the second half of the 20th century the high school or university graduates managed with the knowledge gained during nearly the whole of their professional lives, then now we live in the society where knowledge grows exponentially and the life of new information is relatively short (Sudický 2011, p. 71). The amount of knowledge in the world has doubled in the last ten years and now this interval has lowered to 18 months (Gonzales 2004). Therefore the successful existence in the society and on the labor market suppose integration, a quick and creative use of the latest knowledge distributed in the world through the network.

1.3 Educational theories and e-learning

One of another important elements in a globalized society is that the current school loses the information monopoly. The traditional role of the teacher

who is able to control and influence the incentives influencing pupils is being complicated. Pupils and students have greater autonomy which allows them the access to such information or interpretations of the way of life which goes beyond everything what teachers can provide them. However, teachers do not try to compete with the media or eliminate them from the field of socialization and education but they teach their pupils and students to minimize their potential risks and to maximize potential benefits. M. McLuhan, whose ideas and research in the 60s of the 20th century as to the media, the "global village", "hot and cold media" had been opening the discussion on empirical, psychological and social effects of virtual reality, has drawn the attention to this fact. His statement "the medium is the message" (McLuhan 1987, p. 7) shows how powerful the influence of each medium can be as to the social, psychological and sense level of an individual.

As a response to the penetration of electronic media into education the media pedagogy as a new pedagogic branch originated and it deals with media influence in the process of education and socialization. In different countries it is at different stages of development. It is elaborated for example in Germany, Austria where it is called Medienpädagogik. In English speaking countries (UK, USA, Canada, Australia) there are several terms used: media education, media literacy or media awareness. In the Czech Republic there is the term of media pedagogy used. (Šeďová 2009, p. 787). In Slovakia it is still only creating its own tradition and it uses the term of media education (www.culture.gov.sk). The concerns of the media pedagogy can be divided into three areas. The first one focuses on the media as socializing factors and explores the effects and conditions of this socialization. Since the contents presented in the media are not usually intended primary for education and socialization but rather for the advertising and entertainment, their influence can be counterproductive from the pedagogical point of view. The second area focuses on media education as a means for forming the media literacy. It emphasizes the safety aspect of media education and the development of skills necessary for a critical analysis of media contents. The third area studies teaching by media, it is the *media didactics*. It opens an area for the systematic examination of such questions as: what functions the media and technology fulfill in the process of learning, what is happening with pupils and teachers when these media are being used in teaching and it emphasizes the responsible and effective use of them (Šeďová, 2009, p. 787 -791). In 2009 the Manifesto of the Media Education originated in Germany by the initiative called No Education without the Media! (Keine Bildung ohne Medien!) (www.keine-Bildung-ohne-Medien).

New trends and changes in the pattern of teaching and learning should meet the needs of those students who will live in the information society. The traditional theories do not meet the requirements any longer and they are updated by new theories. Constructivism and instructivism are considered the traditional theories. They were being formed when there was no need to consider the impact of technology on teaching. Knowledge was considered the final stage. *Instructivism* represented a classical model of teaching and prevailed in our school system before its reform. It was based on the transmission of the clearly pre-defined knowledge by an authoritarian teacher to the passive pupils and students. The curriculum and the teaching plans were firmly established. The student's duty was to memorize the specified parts of the curriculum, to save them in the long-term memory and to recall them if necessary (examination, testing). The typical feature of it was the static view at separate knowledge parts which corresponded with invariable synapses in the brain. *Constructivism* is based on the assumption that the learning process is individual and the knowledge is generated from student's own experience and interpretation of the world. The roles of the pupils, students and teachers are changing. A passive student is changing into an active one in the process of different activities, he is in the centre of the educational process and its activities; the teacher is changing from an authoritative source of knowledge to a facilitator and helper who supports pupils and students in their own education (Sudický 2011: 72). The changes in the information society are reflected in *connectivism* (Siemens 2004) or *communal constructivism* (Holmes, Gardner 2006). *Connectivism* defines learning as a global network feature. Its key aspect is to create and maintain network links which enlarge the knowledge basis of an individual far beyond his own capacity. Since there is a large amount of information and they are aging quickly, it is not efficient to build a static knowledge basis but to develop the ability to establish and maintain connections with reliable and specialized sources of information (Sudický 2011: 72). According to Siemens network connections that facilitate our learning and development are more important than the current level of our knowledge (Siemens 2004). Therefore pupils and students should become "managers" of their own learning with the help of teachers (in e-learning also called e-teachers, facilitators, mentors, e-moderators).

Regarding the nature of human learning, the traditional theories cannot be excluded from the educational process. According to Tracey (2008) all the three theories are currently relevant because they reflect individual phases of the learning process. Instructivism principles are applied at the beginning when the teacher gives basic knowledge and information necessary for

understanding the problem. Constructivism and student step into the process of education in the second phase, the student is active and the educator is in the role of facilitator. In the last phase connectivism can be used because it reflects the quick change of information. Pupils or students are building their own learning space within the network which supports their further study.

Complementary model of educational theories can be implied also in e-learning. At the beginning of the study pupils or students have to comprehend the basic information which they can obtain for example using texts, video and multimedia supplements (videos, animations) and by standard evaluation methods (tests) offered by teachers. The static cognitive schema is being created and it is also relevant in e-learning. After the acquirement of the basic knowledge structures constructivist methods are being applied. There are discussion forums, wiki-modules, non-linear knowledge banks searching function in e-learning environment. The most advanced parts are represented by the means and activities which are based on the connectivism theory. They include external news channels, discussion forums, wiki modules, blogs, social and professional networks, for example Facebook, MySpace, Twitter, link databases, etc. There is a condition for the realization of these activities and it is an excellent digital literacy and the development of meta-learning skills. Moreover there is a problem with the evaluation of the provided contents and relevance of information where pupils and students apply critical thinking which is one of the most important kinds of literacy for their development. Pupils and students should have feedbacks from their teachers and also a methodological support of administrators in this combined teaching (Sudický 2011: 73-74).

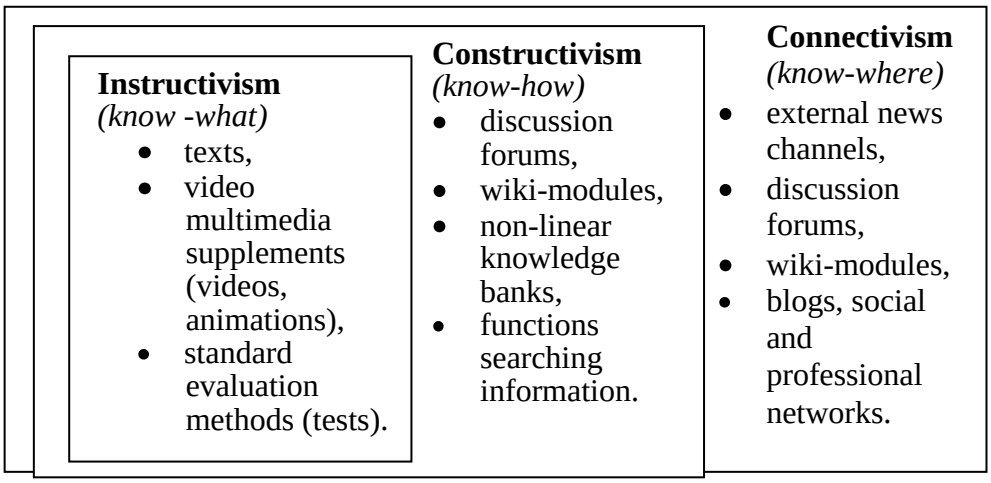

Figure 1. Educational theories and e-learning
Source: own on based Tracy, 2008, 2009, Sudický, 2011

2.2 Requirements for the formation of an e-learning course

The quality of e-learning is related with educational standards. The basic aim of e-learning is to enable and guarantee interoperability – INTEROP (universality – the ability to work at different programme platforms), reusability of the system, educational components or objects. There are several different standards, e.g. SCROM *(Shareable Content Object Reference Model)* which shall provide the transfer of the educational contents between different electronic media and then reuse it. Standard LOM *(Learning Object Metadata)* defines the unified description of the educational content. Standard DIN-DOM (*Deutches Institut fiür Normung-Didactical Object Model)* (Zounek, 2009: 280) is a part of didactic standards and describe the process of teaching, learning and their goals.

E-learning represents a modern form of education and it is gaining popularity mainly in an academic environment while it is still developing and improving. The e-learning form represented by sitting alone in front of the screen is overcome therefore universities and life long learning institutes choose the application of *blended learning* when students meet at the beginning and at the end of the course between what they work without a direct contact with a teacher or other students. Teachers show interest in preparations of e-learning courses of a high quality which will fulfil also didactic aspects, e.g. operationalization of the educational goals, careful selection of the curriculum, reproductive and productive methods of education, feedback and evaluation of the didactic quality of the course. Turek following Maden shows these basic requirements of an e-learning course:

- Preliminary information about an e-learning course has to be non-stop online accessible. It is necessary to inform students and pupils about course goals, curriculum and requirements and about possibilities of communication with teachers.
- To give to people concerned in a course an opportunity to attend a training how to orientate in all the materials and how to communicate with a teacher before the beginning of the course.
- All the materials for study should be interesting using visualization (it makes the whole picture of the presented phenomenon easier), process simulations (behaviour models in real situations), virtual reality (a person cannot only see the studied phenomena but they can move in them and see changes).

- To provide the link to www.pages on the Internet which are related to presented materials.
- To provide technical requirements for the e-learning course.
- To provide the presentation of studied materials in such a way which is suitable for students‘ different learning methods; as to sense preferences we differentiate for example: visual – non-verbal, auditory (aural), visual – verbal and kinesthetic (motional) methods of learning. For students with dominating visual – non-verbal methods of learning it is suitable to present all the materials for their study in the form of pictures, schemes, graphs, diagrams, maps, videos, films and different symbols. Texts should be structured in a graphical way. Students with dominating auditory methods of learning prefer listening to lectures, conversations, e.g. video – conferences or chatting on the special topic. Students with dominating visual – verbal methods of learning prefer written texts which should be structured in an appropriate logical and graphical way. The activities are dominating for those who prefer kinesthetic method of learning. It is necessary to include practical tasks to all the texts.
- The way of presentation of all the materials for study in e-learning should be compatible with the presentation in classical way of teaching.
- Materials for study should be logically structured in literary language.
- External experts should be on-line in the case of necessity, e.g. electronic lectures, conferences and discussions.
- Students should have an opportunity to communicate with teachers and other students.
- Special attention should be paid to testing and assessment (Turek, 2008: 422-424).

According to Smith teachers who prepare and realize e-learning courses should have these abilities:

- To define suitable and concrete goals and requirements.
- To avoid curriculum over-dimension, mainly at the beginning of the course.
- The requirements should be challenging and achievable.
- To master the literary language and special terminology.

- To work out a curriculum of a high quality.
- To define objective, valid and reliable criteria for testing.
- To use effectively all the kinds of ICT. To use quick-response methods.
- To be able of self-reflection.
- To study permanently.
- To be able to transform the curriculum online in didactic way.
- To prepare students for e-learning.
- To administrate an e-learning course effectively.
- To work as a facilitator not as a traditional authoritative teacher. To motivate, to encourage and to inspire students. To have a good sense of humour, to be patient and flexible.
- To motivate students for study, to help them to overcome problems.
- To communicate effectively with students, to provide feedbacks, to respect students‘ different learning methods.
- To support students‘ critical thinking
- To accomplish continuous formative and final assessments effectively and honestly.
- To find out students‘ attitudes to an e-learning course.
- To improve the quality of an e-learning course following the feedbacks and self-reflections (Turek 2008: 425-426).

2.3 Problems going along with e-learning

Implementing new methods and strategies goes also in education together with great and optimistic expectations as to the higher quality but technical innovations do not have to bring just positive aspects. ICT applications into education have their limits and even negative aspects which can jeopardize learning. J. Mareš who followed his own research and also research of other authors drew attention to some facts connected with e-learning.

Electronic learning is better than traditional learning. Comparative research, e.g. R. Clark’s research from 1983 and T. Russell’s research from 1999 did not confirm that using technical devices in teaching brings better results.

Electronic learning has minimum negative side effects. If pupils or students work with a computer, it is just a special example of the human – machine

system. As to the ergonomic point of view, it is a unilateral endurance of some body parts which brings certain health risks. The discovery that people who work online for several hours a week feel depressed and lonely has been forewarning. Psychologists speak about *an Internet paradox*. Virtual fellowships can limit opportunities for direct human communication.

It is possible to base electronic learning upon a programme which is general as to the students and its concrete content is given by an author. Every pupil or student is a unique and unrepeatable personality and so a universal computer programme which would be suitable for everyone does not exist.

Electronic cheating. Optimistic enthusiasts of electronic learning could suppose that pupils and students like learning and will work fairly. But our experience says that we can see many problems of so called electronic cheating. At school we speak about an increase of academic dishonesty. Pupils and students use new kinds of cheating, cyber-cheating, its specific kind is e.g. cyber plagiarism.

Forms of electronic cheating. New technical possibilities form wider space for new kinds of cheating in e-world, e.g.:

cheating based on receiving required information (sending text messages by a mobile phone – short messages, prompts with the help of miniature transmitters, "copying the screen", texts snapped by cameras in mobile phones and sent later to students, copying down from electronic cheat sheets, copying from electronic audio cheat sheets (walkman),

cheating based on work with prohibited materials or prohibited way of using the sources, e.g. copying electronic texts without quoting the source, scanning the texts, pictures or graphs from a traditional source without quoting it, copying foreign texts and translating them with the help of a translator and to present them as one's own, to sign-up into a computer system as a different student and to write a test under his name and password, to use the help of "consultants" in the process of writing the test or oral testing, unauthorised entering the system (recording the grades, changing the grades in e-learning, monitoring the activities of other students working on computers, getting an access to correct test answers.

Possibilities of discrimination of single sided usage of certain technologies. Specialists for the methods of learning remind that there is a group of pupils and students who when learning cannot adjust to requirements of technical devices so their access to the content and goals of curriculum is blocked what can cause other difficulties (Mareš 2007: 177-187).

Barriers in e-learning implementation. Even if we have mentioned that the world "is becoming a planetary village", e-learning implementation comes together with certain limitations, e.g. traditions and strong beliefs that classical teaching in "stone schools" is of the highest quality (there is not the best experience with different forms of study such as external or distance learning), distrust to technical problem solutions in education (teaching machines, teaching with the help of radio or television), conservatism and the lack of experience and digital competence of teachers and school managers, inadequate ICT equipment at schools, inadequate access of teachers and students to ICT , the lack of e-learning programmes of high quality and the low motivation of people who can produce these programmes (Turek 2008: 431).

The loss of interest of students to traditional information sources. Pupils and students expect a quick access to information so the work with traditional information sources as classical books or even written preparations seem too slow, long and difficult for them and not effective.

CONCLUSION

The M. Prensky's idea that the most effective education for the future is happening not at school but after school in robotic clubs, on the Internet or during games may have been provocative in the past (Kalaš 2009: 33-35). The media open new possibilities today changing exerted procedures and bringing new strategies also into education. E-learning represents one of the innovations, it develops meta-cognitive skills of the pupils and students. It is becoming the means of examination, discovery, creation, problem solution, self-presentation and also logic reasoning in new space – cyberspace which is independent of place, time and age of students. But implementing the e-learning into education is not the only way which solves all the problems and so it has to be implemented in accordance with other pedagogic and didactic innovations and with the traditional methods of teaching.

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LEARNING PROCESS AS A SYSTEM

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Abstract*: In the 21st century the learning has changed. There are new learning-environments, motivations, methods and goals. Motivations of learning often determine its purpose or results. The components of the learning and teaching and the contacts between them define the system; otherwise the learning-work of the student defines the process. The paper presents a system model of the learning process. The authors present what does the system of learning means in the 21st century. They speak about the environment of learning, and the goals of learning too. They show the learning process, and the learning system model and the contacts between its elements.*

Keywords*: learning model, formal, informal, structural, functional.*

1. INTRODUCTION

In the 21st century there is more and more knowledge. This is increasingly more difficult to make the process of reception and processing of the user. However, the knowledge becomes the very quickly obsolete, so the renewal time of the knowledge is less and less. We want to learn more and more in less time. In a specific field of knowledge "up-to-date", complex way, however, many-to-know knowledge applied, which means the significantly increased the length of time in learning.

2. CHANGE OF FACTORS OF LEARNING

2.1 Technical development

However strange it may seem, but if we research on the development and the appearance of distance learning, we have to search for its roots in the

correspondence course. According to some researchers, the founder of the correspondent education was St. Paul, (Tiffin, Rajasingham 1995) who has made his clerks write his doctrines and made his messengers spread his teachings. The papyrus was massive product were so it could take the long-distance transport well. St. Paul "has also used a certain degree of interactive items" in his written messages to ensure that his words get into the thought of the followers. He put rhetorical questions in his texts (and even he replied to them). So he has broken the monotonous tune of the written text. These questions-answers had claimed to continue the thinking of the raised thoughts.

Opinion and research result of authors about technical development of learning in 20th century see in chapter 3.

2.2 Changes in the needs of society

"In the second half of the 20th century, however, not only science, technology, but society, and the economy have also begun a fast development, and because of this, the knowledge that we obtain in the schools become obsolete in our active life many times, so that we have to start to learn again and again if we want to save our competitiveness on the labor market. At the end of the 20th century, it has been born the concept of 'lifelong learning'[1] (Seres, Kende, Miskolczi 2008).

Development of info-communication technology (ICT) and significantly changing social needs have effected on the attitude of the people to the knowledge and learning in the third part of the last century.

Today, there is no doubt that the lifelong learning, more specifically, the extending of it to each part of our life is the necessary coefficient of our life. We have renewed our knowledge always to adapt to the evolving changing economic conditions and social expectations – it is essential in the sense in the globalised world. Beyond the individual, personal demands the constraint is often the reason for a continuous learning process as it is in the 21st century's accumulated knowledge that are produced by hyper-society – information has increased almost exponentially from hour to hour. However, a factual knowledge can very quickly become obsolete on any territory/special field of life.

[1] Translated by author.

2.3 Changes in the methodology of education

2.3.1 The eLearning

In the second half of the 21st century, at the end of the 1960s, the beginnings of eLearning were appeared. In the 1970th were already operating networks specifically for higher education (PLATO, TICCIT). The modern ICT supported education has been developed from the end of the 1980th – that formed eLearning, what can change the learning process and the methodology of teaching fundamentally.

"The nice new world of e-Learning is virtuality just so it's only an opportunity, potential a reality ... It is the virtual reality of pedagogy."[2] (Komenczi 2004). Today, probably he thinks himself otherwise these lines, a part of them. Today e-Learning is not only a possibility, not only virtuality. Here is an integral part of our everyday life. *"Virtual reality of the pedagogy"*-type Komenczi. So I would say: the virtual world of pedagogy is the reality.

The opportunities, giving by eLearning, make today's pedagogical practices wider and more colorful. More and more elements of it are displayed and continuously incorporated into the training attendance (joint learning, blended learning), as well as in a large part of the distance learning. In the regular training and in non-formal education systems both, the application of it spread quickly. Today's N-generation, or digital generation, who has already increased by up to life was not in a section, when you do not have a computer, internet, take for granted and require the application of modern techniques, technologies in the field of education too.

The dominance and spread of electronic devices in the education means that we won't talk about *"learning"* and *"eLearning"*. The "*e"* prefix will disappear quickly from this form of education, because the electronic education, e-Learning, as a form of learning will become usual, natural.

2.3.2 The networked learning

The networked learning as a technique is significant, because with the help of technically a specially developed electronic learning curriculum, the eLearning (necessarily), students don't go ahead in the curricula in a linear way, but also the construction of the digital curriculum allows that students explore the existing context independently.

[2] Translated by author.

However, the networked learning not only means the structure of the curriculum, but the possibility (and need) to advance knowledge can be reached, not only from the syllabus but with the using of additional resources (which are attached to it), and which are found somewhere in the virtual space. A virtual learning environment, closed, or the World Wide Web can be the stage or incarnate of this network.

2.3.3 The cloud-learning

The formation of a cloud-learning practice is over the past two years a revolutionary new opportunity for education-methodological issues. From education-technical point of view, I see the importance of it that can allow eliminating the space and time limits and the lack of the presence of personal trainers in the educational system. Virtual consultations, virtual conferences, can be created by the Internet service providers. Thus, the learning support will be not only modern, but also interactive. The services of the cloud support not only the learning of individual student, but it also give thumbs up the teacher and student exchanges. In addition to the individual learning, group learning can also be taking shape.

2.3.4 The networked Learning in a connectivity way

The fundamental principle of connectives means that we view the knowledge, as a network, the minimum elements of which are the nodes in our network. These could be the conceptual definitions, phrases, definitions, any elementary knowledge. The extremes among them are those relationships, with which we connect the nodes. In this sense, learning may mean two things:

- new nodes to be connected to the fabric
- reordering the net connections.

The high-profile (connecting with many edges to other nodes) nodes determine our thinking.

The connectivity view determines the learning process and its relevance in the opportunity of the construction of the knowledge network and its restructure on demand. Thus, our knowledge increases changes constantly through the established network connections. The network research deals with the examination of this new paradigm which is also a method and an approach. The network research, on a micro level, examines the relationships between things, and on a macro level, samples, that drawn by the connections (Komenczi 2004).

3. LIFE-WIDE LEARNING

Needs of the lifelong learning (LLL) is basic from view of point of economy and society in the 21st century. To become a good technician and potential worker is not enough to learn a job when we are young. All life we have to learn that can be professionally recognized. The economic and financial crisis in the world, the changes in societies are demand not to know only one thing, but we are able to stand other areas of life is our place. This is the concept of the whole of life learning, covering the all territory of life (life-wide learning, LWL). The interpretation of KOMENCZI (Bedő 2009): the LLL is at the same time, and the contents of the LWL are determined by the content of the thinking (life-wide learning) in the 21st century. We can see the contents of throughout the life-wide learning (LLL and LWL) context on the Figure 1.

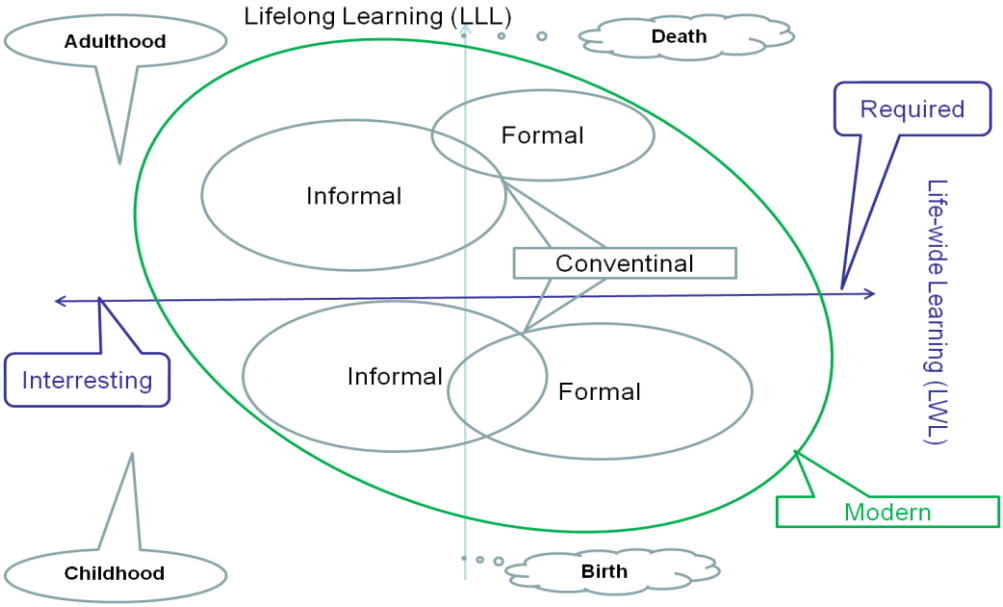

Figure 1. The whole life-wide learning model (by György Seres, Ildikó Miskolczi)

In the 21st century there is more and more knowledge. This is increasingly more difficult to make the process of reception and processing of the user. However, the knowledge becomes the very quickly obsolete, so the renewal time of the knowledge is less and less. We want to know more and more in less time. In a specific field of knowledge "up-to-date", complex way, however, many-to-know knowledge applied, which means the significantly increased the length of time in learning.

4. MODELING OF THE LEARNING PROCESS

In order that we should be analyzed the learning process, we must create its universal model. One of the possible solutions is, if we consider the learning process as a system, and we do our examinations with the rich tools of the system theory.

If we consider the learning process as a system, we must analyze its environment, its purpose and feedbacks, which are provided the contacts between them (Figure 2).

The negative feedback is used for the control of whether the learning process attained his purpose. Positive feedback from purpose to environment generates a new learning process by principles of the life-wide and lifelong learning.

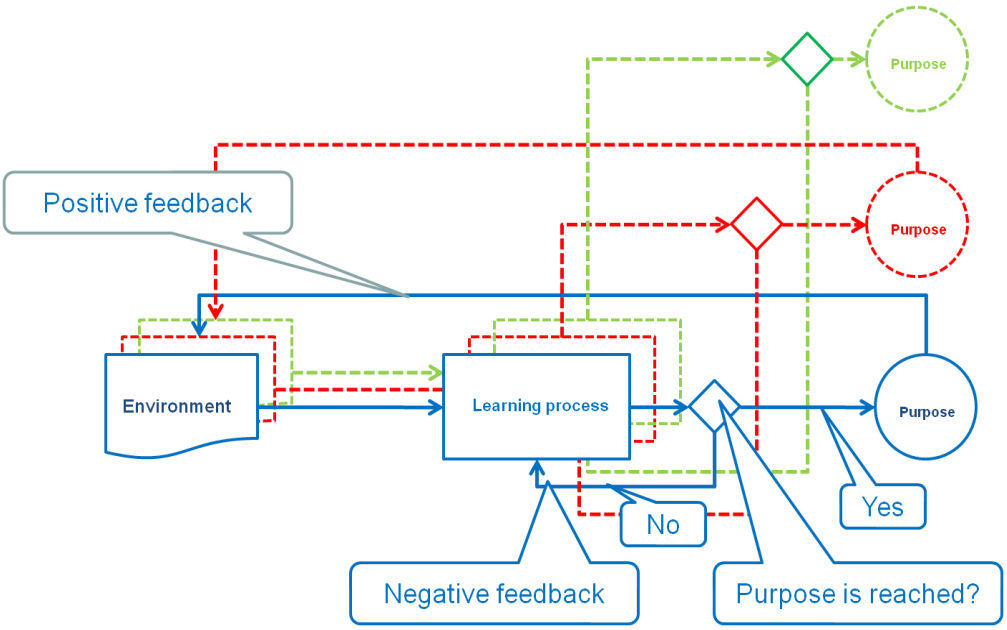

Figure 2. Learning process as a system (by György Seres)

4.1 Environment and purpose of the learning process

Subsystems of environment of the learning process – beside student – are the followings.

– Family with motivation, love and possibility.

– Society with state, economy and friends.

– Knowledge as education, library, internet and masters.

Requirements, conditions and knowledge from environment form inputs of the learning process system.

Increase of competencies, experiences and possibilities form outputs of the learning process system. That's why purpose can be result like that, than:

– Farther study in high school, university or sciences.

– Ethical, material or social advancement.

– Just as well.

Some learning process system can be:

– Formal – like public and higher education or other organized courses,

– Informal – like self-contained learning.

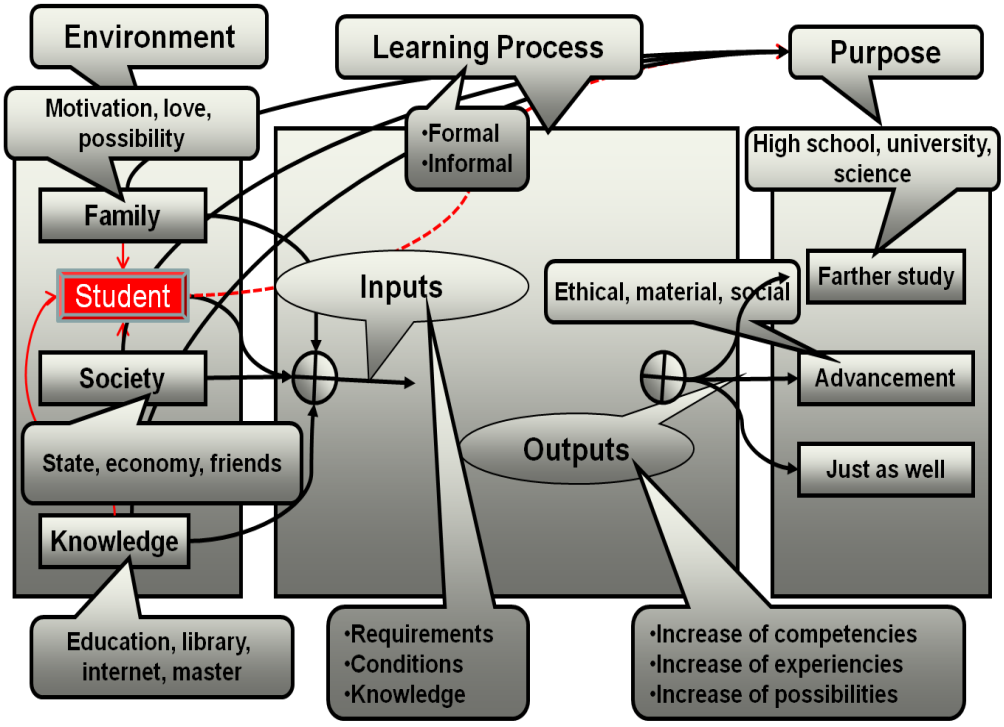

Figure 3. Environment and purpose of the learning process (by György Seres)

4.2 Functional model of the formal learning process

Functional elements of the formal learning process are:

- Curriculum,
- Teaching,
- Learning,
- Measurement.

Negative feedback – measurement of competencies or knowledge – is guarantee of attaining of purposes like farther study or advancement. Positive feedbacks from results of learning process allow that environment

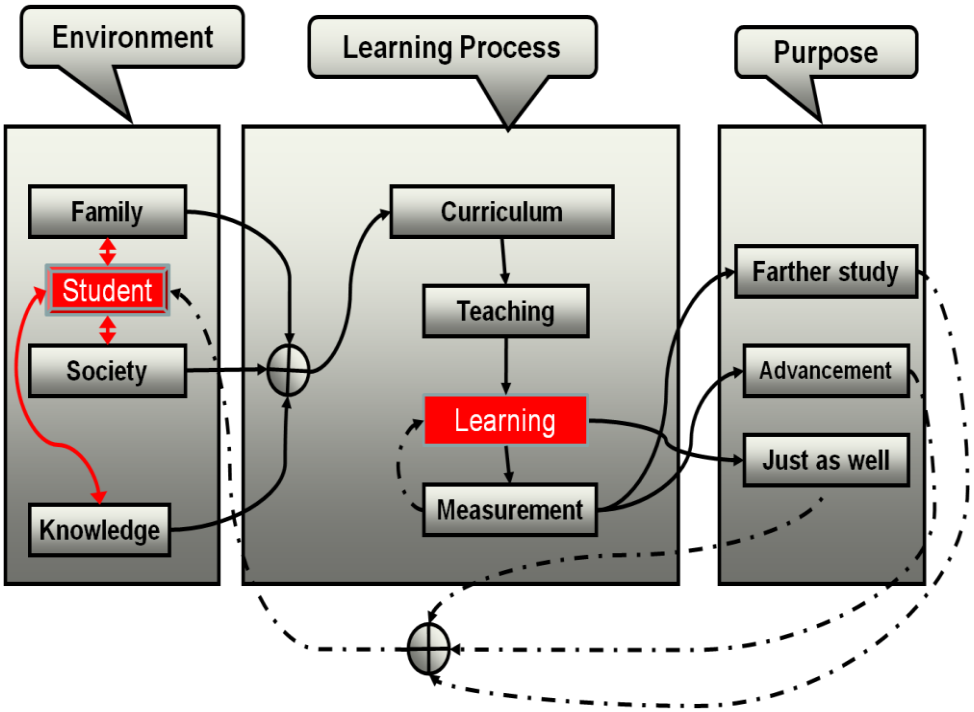

Figure 4. Functional model of the formal learning process (by György Seres)

4.3 Functional model of the informal learning process

There are not teaching function in system of informal learning process, and instead of curriculum all of body of knowledge is of service for student.

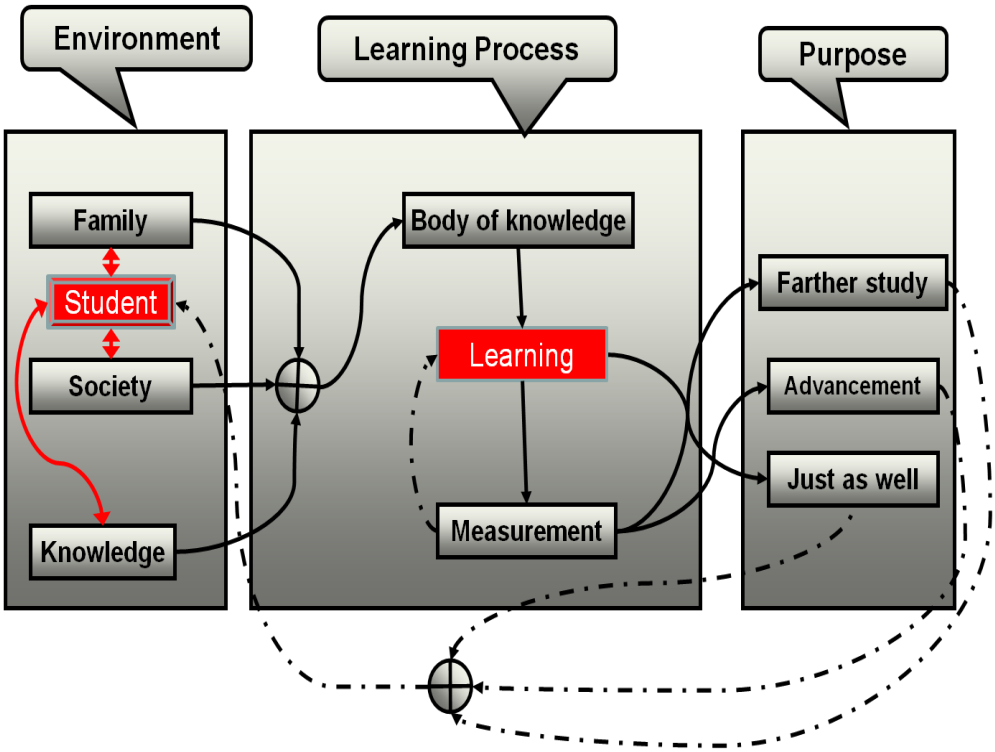

Figure 5. Functional model of the informal learning process (by György Seres)

4.4 Structural model of the formal learning process

The learning process as a system can be analyzed more exactly by its structural model (Figure 6). Structural elements of the formal learning process are:

- Organization of the educational institution.
- Teachers – staff of the educational institution.
- Curriculum of the knowledge, experience or cognition.
- Group or class of students.
- Technology of education, which significantly affect all of structural element of the learning process system in 21st century.

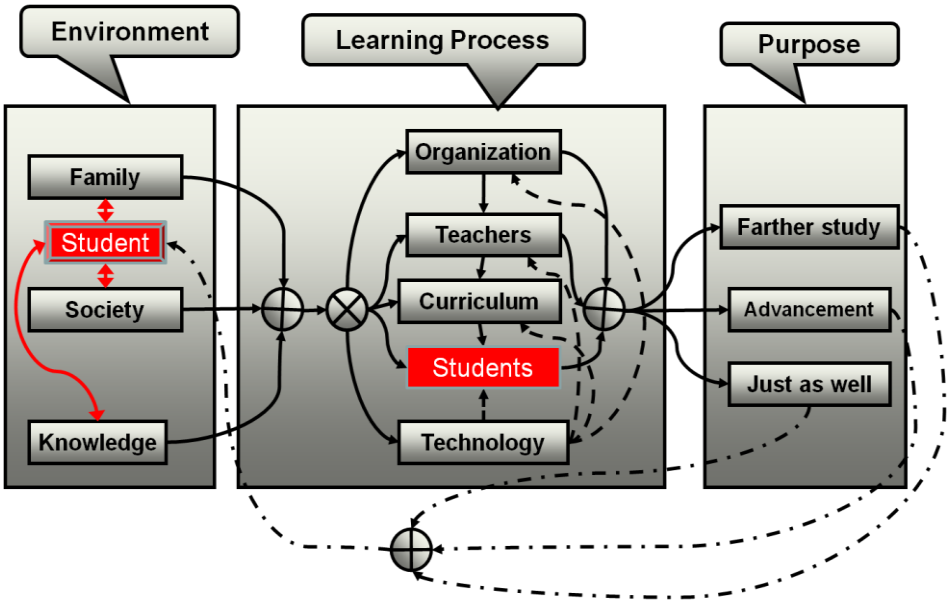

Figure 6. Structural model of the formal learning process (by György Seres)

4.5 Structural model of the informal learning process

The informal learning process system in our time can be effective if students are networked in the learning cloud.

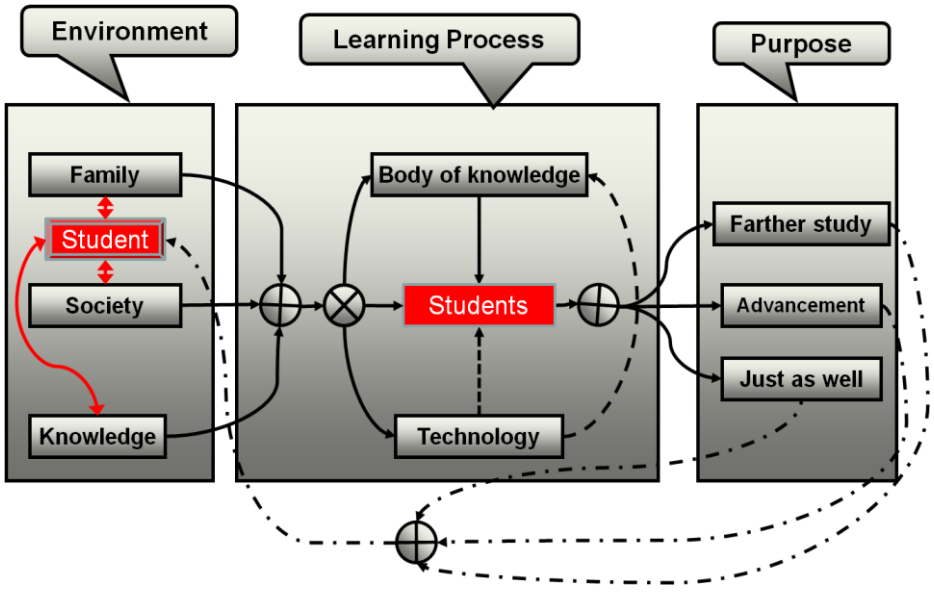

Figure 7. Structural model of the informal learning process (by György Seres)

CONCLUSION

In the 21st century there are many changes in the learning process. There are new environments and processes which frame the structure and the process of learning.

The student's place is special in this structure, because the student is the centre of learning in our model.

The authors of this article show how built the *BUILDING OF LEARNING* in nowadays. Next we show some special respect of our model.

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EVALUATION OF eLEARNING COURSES IN CORPORATE SECTOR

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Abstract*: The work deals with the evaluation of specific eLearning course, which was created for customers of mobile operator. Evaluation of the eLearning course proceeded according to the Kirkpatrick four-level evaluation model. Evaluation questionnaires were adjusted according to the evaluation results, especially those items that are important in the training of employees, but in customer satisfaction surveys are irrelevant.*

Keywords: eLearning, eLearning course, evaluation of eLearning, Kirkpatrick's evaluation model, corporate education.

INTRODUCTION

eLearning penetrated into all areas of education – formal, non-formal and informal. No wonder that it has penetrated into business education. It can be used for employee training and awareness of customers who want information about new products or services (Bartůňková 2010).

In the presented work an eLearning course was created and later on evaluated. The evaluation was performed by use of questionnaires in two periods: immediately after the course and after three months. Analysis of the results of this evaluation brought suggestions for editing evaluation forms and updating course contents.

1. eLEARNING AND BUSINESS EDUCATION

eLearning we understand the use of information and communication technologies (ICT) in education. Among many definitions that can be found in bibliography, we adopted the following:

eLearning is an educational process which uses information and communication technologies to achieve the educational goal: it includes creation of educational objects, distribution of study content, implementation, communication between participants of the educational process and management of studies.

We can use eLearning elements in every form of education, so even in a corporate (or sometimes a business) training.

eLearning is mostly used in distance education, but it is also important in promoting face-to-face study (Zlámalová 2007).

What advantages brings a form of distance education, which disadvantages can we expect?

	for the institution	*for the participant*
advantages	– possibility to increase the number of participants, regardless of lecture rooms capacity – education groups in different locations without the need for commuting – upgrading the skills of employees – monitoring of study process including ending of the course – easy update already elaborated courses	– study at the time in accordance with oneself option – choice of speed and place for study – trials, tests and tutor support – possibility of repetition, returning to the study contents
disadvantages	– formation and preparation of course materials is time consuming and expensive – feedback in evaluating is not easy after the long time since completion of training	– learner's strong motivation – access to the Internet and ICT equipment – no contact with the teacher and other participants

And that lack of social contact caused the need to combine forms of distance and full-time learning; sometimes it is called *blended learning*.

Creating a quality eLearning course requires a large amount of financial and human resources. In these days rapidly changing business environment, increasing competition, need for product innovation, etc. – there are reasons why institutions need to create training courses rapidly (Egerová 2007).

The answer is a *rapid learning*. It can be seen as a service that allows quickly incorporate new courses into the business education portfolio.

In the rapid learning partial phases of the course development and implementation overlap each other. Management of an eLearning project in cooperation with professional experts make the course directly using special tools.

The courses are developed and implemented in the following educational areas:

- training or retraining of a large number of employees;
- introduction of new legislation;
- starting production of new or innovative product;
- transforming key skills, etc.

2. BENEFITS OF eLEARNING IN THE INSTITUTION

Training and development of their employees is one of the most important factors for increasing productivity and competitiveness of the institution. Investment in human resource development assumes to be of the same importance as a comparable investment in technological development. For this development it is necessary to train new employees to gain new knowledge and skills they need to carry out the function and responsibile decision (Folwarczná 2010).

For institution, it is important to develop effective education system, as this creates a presumption for new habits in doing and thinking, and thus supports the efforts of employees about their personal and professional development. The institutions associate the education of employees with their evaluation.

Benefits of eLearning training in institutions can be found for example in the case studies. It can often be benefits for the institution in measurable factors, which are customer satisfaction and employee.

Examples of the benefits of the introduction of eLearning in institutions (Pejša, online)

customer	*cost reduction*	*increase income*
Czech insurance Company	– elimination of administration associated with the organization of courses – financial and time savings, including the initial cost	– substantial shortening of training on new products – competitive advantage in the market – image of a progressive innovator
Czech Railways	– minimize commuting time for the training	– increase computer literacy of employees – increase confidence and ability to accept changes
O2	– saving financial resources – transfer of funds to projects with high added value	– positive impact on company performance due to accelerated response to the educational needs – corporate culture change towards a learning institution – strengthen the image as a significant player in the field of employers
McDonald‘s	– solve the problem of everyday obsolescence of training materials	– attractiveness of teaching – the ability to track learning outcomes – quicker understanding of subject matter

3. METHODS OF EVALUATION

Evaluation should always be done with the consent of all participants and they should look on it positively. Before the evaluation is implemented, the criteria and methods of data collection should be consulted with participants (Eger 2005).

At the beginning of the evaluation procedure it is necessary to determine some basic items (Nezvalová 2002):

- objectives of evaluation;
- performance indicators – indications of success, they can determine whether the objectives have been achieved;
- evaluation tools – determine the information that is necessary to get, where we can achieve it and its sources;
- evaluation report – an evaluation of monitored activities that were the subject of evaluation in a certain period; it should include also the results and goals, which were not achieved.

The overall plan of the evaluation process involves the theoretical evaluation methods, tools, arrangement of events including a time schedule (Fialová, 2007):

- Analysis of evaluation objectives.
- Choice of an appropriate method and its implementation in several steps:
    1) analysis of the educational objectives;
    2) determination the target group;
    3) evaluation plan (formative, summative) and methods of measurement (qualitative, quantitative);
    4) use of evaluation tools;
    5) evaluation timetable;
- Analysis of data and results.
- Formulation of a final report.

The methods used for evaluation:

- questionnaires;
- written tests, oral tests;
- projects;
- tutors' reports;
- interviews with participants;
- shadowing courses;
- supervisors' reports.

In practice, results of evaluation are summarised by a responsible person in the institution then the results are usually handed on to (Hronik 2007):

- supervisor of eLearning course;
- manager responsible for business training (human resource development)
- tutor and senior lecturer;
- participants (learners).

4. eLEARNING COURSE T-ZONES

An eLearning course intended for the mobile operator customers was designed, created and evaluated. The course deals with one of the services offered to customers – T-zones service (Färber, 2009). The course was designed according to the scheme of Instructional System Design (ISD). It is also sometimes known as an educational parallel to the software development process. It breaks down into five phases, whose acronym ADDIE (Analysis – Design – Development – Implementation – Evaluation) is used as an equivalent to ISD (Kapounová, Pavlíček 2002).

The initial state was such that the mobile operator used eLearning courses only for their own employees. Introducing new services to customers from the big companies went only as full-time training. Other customers were to rely only on information leaflets and brochures or the Internet. Thus eLearning course was created, which introduced the T-zones portal.

The course has six parts, each dedicated to one portal service. Flash animations were prepared for each chapter. The course was implemented in learning management system (LMS), Moodle system was chosen. Evaluation questionnaires were also included into the eLearning course.

4.1 Course evaluation

Evaluation of the eLearning course proceeded according to the Kirkpatrick four-level evaluation model (Karadžos 2009; Kirkpatrick online). The course was evaluated only on the first three levels. An electronic questionnaire was designed and participants filled it in after the course. The second questionnaire was filled after three months in order to evaluate the use of acquired knowledge in practice. The first questionnaire was completed by 31 participants, the second by 28 participants of the course.

1st level of the Kirkpatrick model

At this level a satisfaction of participants is measured, their feelings, relevance and interestingness of educational course.

We explored basic information about participants and their experience with our portal.

- type of customer (employee, entrepreneur, private person - prevailed entrepreneurs);
- current (initial) experience with T-zones portal (they mostly did not know anything about our portal, or they knew and did not use it);
- attitude to the appropriateness of initial workshop to familiarize with the course (mostly they did not express any interest about an introductory lesson);
- the degree of topicality of information provided in the course (rated very positively);
- how exercises in different parts of the course are evaluated and what is their practical use (rated very good);
- query about failures, functionality or other problems (about 80 % of users had no technical problems);
- query about the user-friendly environment in the course (rated very good);
- query about good orientation in the course (rated very good);
- query about communicate with the tutor (rated excellent);
- question on satisfaction with instruction through eLearning (rated very good);
- question on general satisfaction with our course (rated very good);
- query about suitability of tests into eLearning course (rated negatively) – note: respondents expressed rather their feeling about this particular course, it is obviously not related to eLearning tests in general;
- question on significance of test results for participants (rated as totally irrelevant).

2nd level of the Kirkpatrick model

At the second level it is measured, what was the impact on teaching skills and perceptions of participants. It is expressed as the ratio of input and output of knowledge. Data for the evaluation of this level were obtained from tests at

the beginning and at the end of the course (pretest-retest). The success rate for the second level of the Kirkpatrick model showed a subsequent retest – the knowledge is increasing of 9.4 %.

3rd level of the Kirkpatrick model

At this level it is determined how the participant's behaviour has changed due to training in corporate course, and if learned skills and knowledge of the participant begin to make use. In the first questionnaire, the majority of the participants expressed that they do not use our websites, some of them know about their existence. In a subsequent questionnaire, 39 % said that they used the portal, 23 % considered doing this.

4th level of the Kirkpatrick model and ROI (Return On Investment)

At this level the effect of learning in the institution is measured, whether the results of an instruction affect business results. We could evaluate the financial indicators such as average spending for services. In the course, that was prepared for school thesis, cannot be determined the investment or operating costs. We are not able to determine their possible return with respect to benefits of the educational process.

Modification of the evaluation forms

Designing and evaluation of eLearning training for customer of our institution need to take into account that the customer completes these courses voluntarily. This is not about students at the school who need to qualify for the title, nor the employees of the institution; increase of their knowledge and skills is required by their employer. The customer decides on the subsequent change in use of our services or purchase of our products, and therefore extra knowledge acquired from his point of view are irrelevant.

The customer expects from the course to be familiar with the product and its use, about options that could work for him.

Customers considered tests as unimportant, regardless of their results in the retest. Customers who have called tests as useless: 20 % of them use our websites and 13 % uses them at least partially, and they all learnt about these websites in the course. Their level of knowledge in the retest was 67 %, which is very close to results of retest of all customers.

The results showed possible changes in eLearning course for a specific group of participants – for customers. Assessments of customers' knowledge do not affect the objective of the courses – to present a product or service to a customer to convince of purchasing it and use it. Quality of costumer

knowledge in the course is irrelevant for him to determine the suitability and usability of a product or service.

CONCLUSION

The responses of course participants: 55 % considered tests as useless, 40 % as irrelevant. Although this negatively comment on the tests and regardless of their results, 20 % of participants use the websites, 13 % at least partly and 13% considered to begin to use them. The course brought all these learners to use our portal.

Based on the results of the evaluation, questionnaire was modified. Questions for the customers need to be designed differently than tests for employee training. Especially as it relates to testing the knowledge gained in the eLearning course.

An option to be assessed should be left to the course participant. Many tests should lead to a negative attitude to the institution and its products and services and the course should become disserviceable. Employees with insufficient knowledge from the course can be even released by their institution, but not the customer.

Tests from such eLearning courses should only be in the form of auto-test (self evaluation) for eventual verification of knowledge and only according to customer's own activities. On the contrary, attention should be given to practical exercises and case studies.

When preparing eLearning course it is necessary, simultaneously with the project course, to design an evaluation of the project. We need to intend targets of evaluation, for the results have to serve as a tool for feedback and not only for formal purposes.

ACKNOWLEDGMENT

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BLENDED LEARNING OF COMPUTER PROGRAMMING

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Abstract: *Courses on computer programming are considered demanding for both students and teachers. In order to enhance the quality and efficiency of programming learning/teaching, we have been trying to determine the optimal way of combining the traditional but beneficial classroom methods together with ICT approach typical for e-learning. During the past 7 years, several Moodle courses concerned with introductory as well as advanced computer programming have been developed and evaluated at the Department of Informatics, Constantine the Philosopher University in Nitra. The online environment of the above-mentioned Moodle courses has become an integral part of the related subjects. In this paper, we describe some Moodle activities grounded in constructivist and constructionist learning theories suitable for electronic courses focused on computer programming. The learning activities were designed, verified and improved repeatedly in more successive iterations. We summarize our findings based on experience, suggest best practices and discuss some ideas for further research.*

Keywords: blended learning, programming, constructivism, Moodle, design-based research.

INTRODUCTION

Computer programming is a crucial part of every CS/ICT-oriented curriculum. Although it has been taught at universities for decades, there are still many challenges to teachers and researchers concerning various aspects of the problem area. The state-of-the-art survey (Bennedsen, Caspersen & Kölling 2008) addresses the key problems associated with the teaching of programming and shows solutions based on proven implementation and

real experience. The authors deal not only with issues related to introductory programming courses (e. g. exposition of the programming process, apprentice-based learning, problem-based learning, object-first approach vs. other approaches, use of online tutorials, assessment of programming assignments and projects, active learning enhanced by technology etc.), teaching of more advanced topics of software engineering is covered as well.

Courses on computer programming are considered demanding for both students and teachers. We find the introductory programming courses a special case. The introductory course is intended to provide novices with fundamental programming concepts and skills as well as cultivate abstract, formal and creative thinking together with general problem solving competences. Poor understanding and insufficient training can affect students' future prospects in other subjects negatively. Besides coping with the difficult content, there are more factors influencing the learning/teaching process: The number of first year students is typically high. Students differ a lot as for their previous education, programming experience, motivation and abilities. Usually, they are just familiarizing themselves with the academic environment while attending the course. Many of them are not used to self-study yet and lack the active approach.

The character of an introductory programming course's curriculum implies that learning activities for lectures and labs should be designed carefully in a constructivist/constructionist manner (e. g. Papert 1980) with respecting students' individual learning styles (Felder, Silverman 2003). Students should construct knowledge actively on their own but with proper guidance of an expert and in collaboration with fellow learners. Teachers are expected to prepare motivating learning scenarios that enable students to explore the topic and discover connections within the context. Digital technology should be used to enhance the quality and efficiency of learning where applicable. In the following sections, we present the blended learning/teaching realized through LMS Moodle as an appropriate and effective learning/teaching strategy.

1. BLENDED LEARNING IN COURSES ON COMPUTER PROGRAMMING

1.1 Traditional methods blended with e-learning

Blended model integrates two learning environments, the classroom and the virtual one, into a single system. Learning activities conducted under the

blended model vary as for their delivery media and their benefits for learners. The blended model includes:

- traditional classroom activities,
- classroom activities with digital technology (DT),
- e-learning activities in a Moodle-like virtual learning environment (VLE).

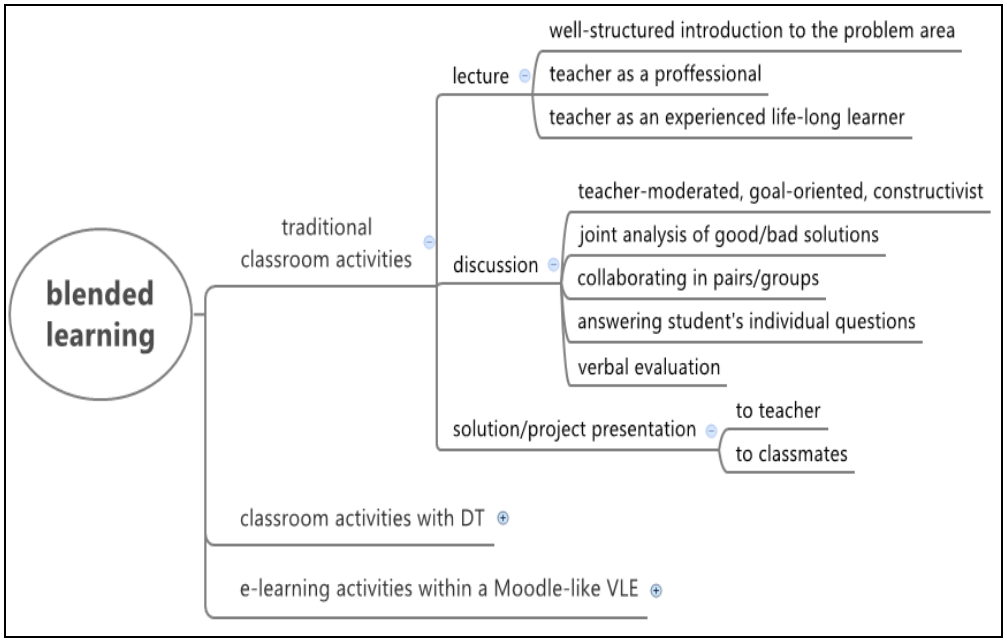

Figure 1. Traditional Chalk & Talk Methods in Programming Courses

Source: Own

The interpersonal interaction as a key component of the face-to-face learning environment encourages active reflection, helps to eliminate initial misconceptions and develops the communication and collaboration competences in students. In small-scaled groups, teacher can apply the individual approach better or adapt the learning scenario to the actual classroom situation.

Learning by doing/making (creating functional pieces of software) is a constructionist way of acquiring programming knowledge and skills. During lab exercises, students solve various problems concerning program's development. To improve retention and foster deeper understanding of abstract concepts and dynamic processes, specialized educational software can be used.

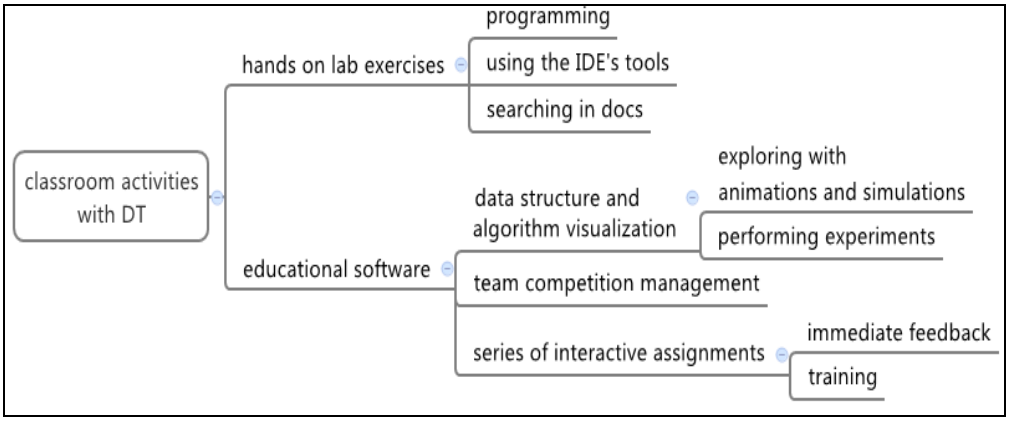

Figure 2. Digital Technology & Classroom Programming Learning.

Source: Own

Moodle-like learning management systems provide an effective solution for managing the out of the class activities of even large-scaled groups. We use the Moodle system to build an online learning community similar to informal social networks. The e-courses include resources and activities meant to guide students' self-paced learning. The chapter 2 contains several concrete examples.

Efforts have been continuously devoted into the research of blended learning as it has become very popular, especially at the university level (e. g. Hadjerrouit 2008). The research related to programming education focuses mostly on online assignments that can be assessed automatically (Edwards et. al., 2011, Parlante 2011). In (Wang et al. 2008), the authors suggest an online computer programming clinic with senior students serving as consultants for novices. The study (Hwang et al. 2008) grounded in Bloom's Taxonomy attempts to design a series of web-based learning activities to enhance students' cognitive developments in programming. Three types of activities were evaluated and compared (gap filling, program debugging and peer assessment). The activity of peer assessment was found to be the most beneficial as well as the best predictor variable of students' learning outcomes.

1.2 Blended learning of computer programming at the CPU in Nitra

We have been using the online courses implemented in LMS Moodle since winter semester 2004. The non-Moodle experience from the preceding two year period (with a teacher's web site as a medium for delivering information, electronic study materials and assignments to students) was an important initial point. During the first three Moodle years, an extensive

qualitative research was conducted within the introductory programming course intended for prospective teachers of informatics as well as the professionals in the field of applied informatics (with about 170 students per semester). We were inspired by the paradigm of the design-based research (Design-Based Research Collective, 2003). In-depth observations were made while teaching in classroom and tutoring in the online courses. Questionnaires were used to get feedback from students. The learning resources and activities were evaluated each semester, improved/redesigned and verified again during the next semester's iteration. In (Palmárová & Lovászová 2007, Palmárová 2008, 2009), main findings of our research were summarized in detail. We investigated three research problems in relation to the blended model of learning/teaching:

- students' attitude towards programming,
- individual approach,
- systematic and active learning.

The interactive learning portfolio of a student and the methodic portfolio of a teacher, both saved electronically within the online course, were identified as being the most useful benefits. The Moodle database archives information about students' learning activity throughout the semester. These learning portfolios are helpful when deciding the final assessment or consulting learning problems with student. To adapt the contents of the course comfortably, teachers can choose from alternatives stored electronically within the online system. This personal methodic portfolio with different/older versions of assignments or study materials is in a hidden section accessible for teachers only.

Some of the best practices are suggested in the following selection of e-learning activities that we have been using successfully in our Moodle courses during the recent years.

2. E-LEARNING ACTIVITIES IN COURSES ON COMPUTER PROGRAMMING

When designing an online e-learning activity for a programming course, we adhere to the principles of a constructivist/constructionist learning theories. We think of the online course as an integral part of the learning/teaching process. The e-learning activities must be planned carefully as they directly extend and complement weekly held lectures and lab exercises. The main goal of our online courses is to guide students' self-study and to make the

individual approach possible. We want students to study on a regular basis and actively train their programming skills by solving scheduled assignments and learning with interactive applets. To strengthen the motivation and the feel of being a friendly learning community member, communication and collaboration among students and teachers is supported via discussion forums. We consider reading the essential component of every studying. Speaking from experience, there are many university students with text comprehension, technical terminology and formal notation problems. We found this a key competence of a life-long learner, so we pay attention to the reading activities too.

2.1 Reading comprehension exercises

The online courses provide digital study materials. We noticed that students tend to use the handouts from lectures as the only source of knowledge. We have realized that students' behavior during lectures is a bit strange since data projectors and presentations emerged. Most of them just passively listen to teacher and watch the long multimedia presentation without need for noting something down. So we stopped putting „the whole stuff" on slides and have incorporated traditional writing activities into lectures again. Some problem solutions are developed step by step by creating the notation on blackboard/paper. Mind mapping is used to train the note taking skills as well. The review questions are stated on slides without answers but discussed live. Students are asked to search for help in specific books or internet resources occasionally. The lecture finishes with an advice on using the topic-related e-learning activities.

For reading activities, the Moodle's *Book* module is used. With hypertext links, the study material can be structured better. The clear format of source code samples is very important for programming learners. We end reading activities with a brief summary and encourage readers to answer questions/solve few tasks immediately after the reading. We find this a good way to make students actively reflect on new concepts and apply new procedures. These interactive auto tests realized by the Moodle's *Test* module should consist of questions/tasks of different quality as for their educational objectives. We use the Niemierko's taxonomy of educational objectives in cognitive domain when designing the auto tests (Fuller et al., 2007). These auto tests are not compulsory but helpful as students get used to the electronic testing during the semester and are prepared for the final exam better. The test system gives students some constructive feedback with explanations in case of bad answers or uncertainty. We recommend including

dictionary of terms in the online course too in order to point out the importance of proper professional language.

2.2 Learning from an expert

Typically, students study sample solutions (algorithms and their implementations) from textbooks or directly analyze the commented source code of projects produced by teachers. However, for many learners, it is very difficult to learn this way from the very beginning. Less experienced or slower students appreciate the opportunity to replay and imitate a teacher's solution process at home. Using a software for recording all screen and audio activity on your computer (e. g. CamStudio, Wink), all thinking and technical steps during a program's development can be saved and then watched repeatedly. It is an experience similar to the face-to-face approach during lessons. In our Moodle course, several videos presenting complete process of developing simple programs in Java using the Netbeans IDE are available.

For talented students capable to proceed quicker or those who are motivated to study more difficult problems on their own, specialized Moodle books (tutorials) were prepared. The hypertext helps us to structure the problem analysis, solution design and implementation into smaller, better understandable units and to navigate a learner during reading so he/she can solve the discussed problem (implement and test the program) actively together with the tutorial's author. Partial solutions (incomplete but functional projects with comments) are available at tutorial's checkpoints, so students can explore them, change them or finish individually at any stage. We use these tutorials especially in more advanced courses for 2nd year students.

2.3 Active and systematic training, problem solving

We examined and compared several ways of promoting motivation and systematic active learning (compulsory vs. optional assignments, personal presentations of solutions during labs vs. electronic submitting into the online system, verbal evaluation vs. points without verbal feedback, assignments generated randomly from a database vs. fixed sets of problems common for all students, regular scheduling vs. evaluation at the end of the semester). Our research showed that compulsory homework motivates students more than the optional. Today, we prepare sets of assignments as a partially compulsory activity every week. Points for uploading solutions in time can help students to get better final assessment and prove that the student himself/herself personally cares about being a good programmer. Students are free to choose from problems sorted in increasing difficulty. With this approach, slower

students feel less frustrated as they have chance to get some points for simpler problems (apply knowledge in typical situations). Advanced students can focus on more difficult problems (apply knowledge in a more creative way). The Moodle *Assignments* activity is used for uploading solutions into the system as well as recording the teacher's assessment and short verbal feedback with comments on errors or some useful recommendations. After closing the scheduled uploading activity, sample solutions of all problems are published.

In advanced programming courses, students usually possess more learning responsibility, so they work more independently. They create their own collection of programs continuously using the Moodle *Assignments* activity with advanced uploading of files permitted. The collection is controlled at the end of the semester. Implementation problems are discussed personally or in a dedicated online forum.

After having a positive experience with Nick Parlante's CodingBat code practice portal (102 full-time and part-time 3rd year students were asked to use it within an optional Java course), we plan to integrate similar activities into the introductory programming course as well. The portal offers short exercises that are solved directly within a web browser. Students write short Java methods that are tested automatically by the server. The assignments are focused on training the algorithmic thinking and basic Java coding skills. The number of tries is not limited. Accepted solutions are rewarded with a golden star.

Several software systems that support automatic evaluation of programming assignments are used around the world. Most of them test the solution on predefined input values and give just the yes/no answer to learners. For novices attending the introductory course, we find also the feedback from real teacher necessary. Analysis of students' solution provides the teachers with valuable information too.

2.4 Interactive applets

When using specialized educational software in classroom (e. g. for visualizing sorting and searching algorithms, recursion, backtracking, operations on lists and trees etc.), students are able to use it at home as well. We make the software available as embedded applets (Java, Imagine Logo). We recommend using educational software with intuitive GUI that involves users in solving concrete tasks. Short „how to use it" remarks are added to every applet included in the e-course.

2.5 Communication and collaboration with fellow learners

All participants in the online course have to upload their photos into the system. This makes the communication within the electronic environment more natural. Students appreciate the opportunity of contacting their teachers or classmates when studying on their own at home. The posts in forums are usually formulated in an informal way. Students are not afraid of asking anything and they are willing to discuss the topic also with other students. In our opinion, this contributes to friendly and motivating atmosphere in the course significantly.

We classify online discussion as an informal self-coordinated collaborative activity. However, the role of teacher may be important in such activity as well. Participation of teacher increases forum's credibility. For example, in the introductory course, we set up a Moodle discussion forum for conversation about homework. Last year, there were 65 participants monitored in the course: 2 teachers, and 63 students of applied informatics. We were interested in students' activity in the discussion and the effectiveness of collective intelligence in problem solving. In the forum, 32 topics have been discussed: 8 discussions were related to organization of the homework, and 24 discussions were concerned with programming problems. More than half of students (58%) took part in the discussions actively: they initiated discussion by putting a question to the forum or they helped to solve the discussed problem by answering the question. Teachers also participated in discussions. They answered both types of questions referred to organization, and programming problems solving. The number of problems solved in discussions without teachers' intervention represented 25% of all problems.

To encourage students' participation in discussions, teacher may include some kind of assessment into the forum. Students (or teacher) may rate the quality and usefulness of contributions. To get the high rating in the community is an additional motivation to take part in the discussion.

2.6 Sharing the artifacts

In advanced programming courses, we use the Moodle *Forum* activity also with slightly different purpose. Students publish their essays by starting a separate discussion thread, with attaching additional files (e. g. image or source code) when needed. Other students vote for best contributions by giving points. The *Database* activity module allows the teacher and/or students to build, display and search a bank of record entries about any

conceivable topic as well. However, we found the *Forum* activity more flexible solution.

CONCLUSION

This paper deals with *learning of programming*; the problem of testing the programming knowledge and skills is not discussed intentionally. The score for problem solving e-learning activities included in the introductory course is taken into account as evaluation of the student's work carried out during the semester. It helps with identifying of talented students as well as those with poor results. However, the final exam (practical tests and theoretical programming realized with Moodle, but in classroom environment) is more important for us (and typically correlates with the e-learning score).

Since winter semester 2011, the Moodle 2.1 is installed at the CPU's e-learning portal. This is a good motivation for trying some new or redesigned Moodle activities (e. g. peer assessment activities based on the *Workshop* module, completion tracking, conditional activities etc.). Although the idea of intelligent adaptive e-learning systems has become very popular, we still believe, that it is the constructionist learning/teaching strategy together with students' learning competences determining the quality of learning results, not the sophisticated adaption capabilities of an automat.

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III. PRACTICAL ASPECTS OF DISTANCE LEARNING. DISTANCE LEARNING AND LIFELONG LEARNING

LMS AND OTHER PROGRAMS AND THEIR APPLICATIONS IN EDUCATIONAL PROCESS

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Abstract*: This paper deals with e-learning and its use in the learning process. It briefly describes the current state of e-learning at the University of Matej Bel. The following section will introduce the practical experience with the program NetOp School used at the University of Matej Bel in Banska Bystrica. Further the effectiveness of e-learning especially in distance education will be explained. Also the Program Learning Management System "Enterprise Knowledge Platform - Silver" and its possibilities and the use at the UMB will be described.*

The document also includes the creation of animations for schools in Captivate Win EVLP program. The author of courses in LMS EKP can very easily create animations as supplemental materials for their modules inserted in e-learning portal. Further the document deals with the possibilities of remote support (online) using the program NetOp On Demand Remote Control.

Keywords: E-learning Program NetOpSchool, Internet, Help Desk, NetOp On Demand Remote Control, virtual schoolroom, Captivate Win EVLP (Volume Licensing Education Program), Learning Management Systems, e-learning portal EKP (Enterprise Knowledge Platform) at Matej Bel University, EVLP license EDU licenses, Information Technologies, Information and Communication Technologies.

INTRODUCTION

Information and communication technologies are not supposed to be the educational goal, but the means to implement new dimensions of the education for pupils and students, as well as for teachers. It is not sufficient to equip schools with multimedia computers and connect them to the Internet. An important part must be a teacher's preparation to work with information and communication technologies and their didactically correct application in the educational process. At the same time it also provides new methods and ways of working to promote an active and creative work of students.

New technologies reduce the workload of teacher from the often stereotyped, mechanical work, and make opportunities for creative activities while motivating students. From the point of effects on students new technology is a sort of "driver" raising the demands on itself, on its own cognitive development through the opportunities which new technology provides: illustration, easy access to current information, the possibility of processing the application, adaptation pace of work student mental ability etc.
What are the advantages or disadvantages of learning through e-learning, what are the pros and cons for the student and teacher, what is the influence on the development of student's or teacher's personality and their verbal communication and other attributes of personality is not the task of this contribution. We will focus on some potential uses of EKP Learning Management System (Enterprise Knowledge Platform), and also the use of other programs in education.

1. NETOP SCHOOL AT THE UNIVERSITY OF MATEJ BEL

UMB č. 5/2002 development projects, which was brought on 15 April 2002 at the Ministry of Education "Promoting computer-assisted learning (e-learning)" began to create clearer contours of e-education at UMB.

In computer labs of faculties of UMB there was no specialized software used designed to support the frontal education, which was associated with low efficiency of education achieved. Great demands on the performance of teachers, time delays associated with an individual approach to students or file transfer and handling of CD ROM disks. The teacher in preparation for the lessons was organizing his/her teaching materials mostly in the form of MS Office products (Word, Excel, PowerPoint and others) which he assumed to use during the explanation of the new subject matter. During the explanation the teacher used traditional chalkboards, or overhead projector or data / video projector. Students were losing direct contact with information

on the computer screen during the lesson. During their own computing experience the students lacked the appropriate methodological approaches in the form of prompt text or image information. When any of the students needed help, the teacher had to sit at their computer and was able to concentrate on only a limited number of individuals or students. Also using data / video projector in the computer lab at the time was very uneconomical (expensive investment and operation). There was definitely more disadvantages; we mentioned only a few.

These problems can be minimized by using a specialized program oriented on learning with the help of use of computers. As the sample solution prepared for the project was selected software called "NetOp School" by the Danish company Danware Data AS.

The aim of the project was to achieve greater efficiency in education using computer labs, along with better use of existing hardware (computers, networks) without additional demands on investment. Also the aim was that the computer classroom would be used for teaching of other subjects not directly related to computers by using software easily manageable by teachers who are not computer experts.

NetOp School Program is a tool based on the use of PCs in the learning process. With this tool the teacher can easily monitor all computers in the classroom and control their use. NetOp School was developed by teachers for use in an environment of standard classrooms. This program can also be used in setting of virtual classrooms where students and teachers are interconnected via physical communication channels, such as LAN and WAN, Intranet and Internet.

The teacher does not have to be computer experts, but he has to be a professional in teaching his subjects. The program will provide new opportunities for him, something which had not been previously easy. The Students' computers will turn into an interactive whiteboard, where the students follow the interpretation of a new material or work together with the teacher. Using NetOp School program in any case will increase efficiency in the teaching process and students will love the feeling of coping easier with the course.

1.1 Software Features

Installation:

- Installation of a student or teacher takes only 2-3 minutes.

– To establish the class it is required to name it. Program will automatically find all the students belonging to this class.

– After logging in the teacher can see who is absent.

– All it can be set on the student module is the communication protocol, the computer name, the name of the class and the permit to request assistance, through which students will send the teacher text messages.

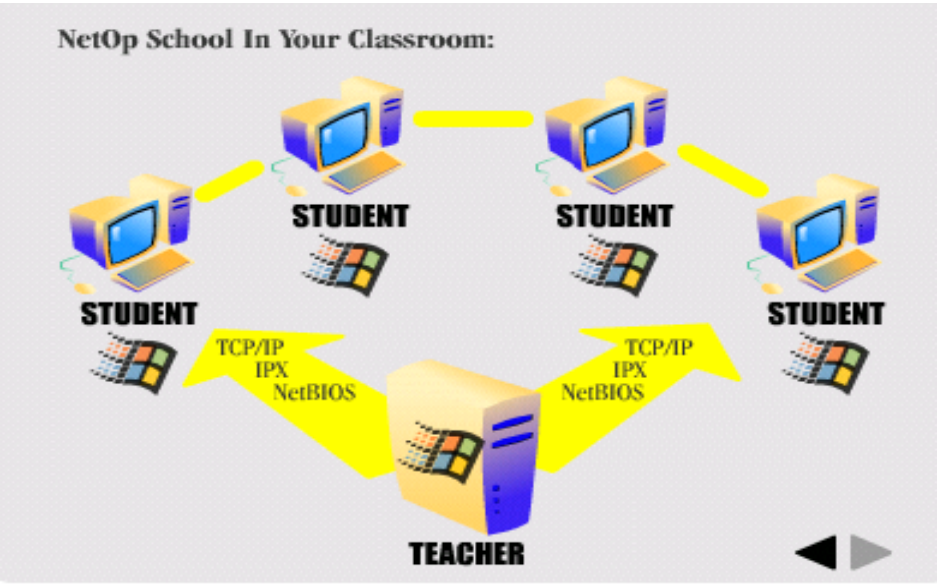

Figure 1. Schematic representation of the virtual classroom

Source: Prospectuses, NetOp, Birkerod-Denmark

Possible views of the classroom:

– through a detailed list (check for absence),

– mosaic as thumbnails, students are arranged according to their position behind computers,

– tree view of a set up of the students,

– Viewing the activities of one or more students on one screen.

Explanation of new study material.

– After the function "Demo" is called the whole class listens to the teacher. Keyboard and mice of the students are dysfunctional.

– Teacher shows his screen to all students while working on it, or any of the students' screens as an example for others.

- The program allows to simultaneously run the same applications on all computers of the classroom.
- Marking mode replaces the traditional blackboard.The teacher can draw on the screen in different distinctive features of the graphic - arrows, lines, circles, squares ...) using different colours. The background has a clean surface or the original image (eg, Excel file or anything else).
- Monitoring of one, several or all students is one of the most powerful features that allow to check students' work in real time without them knowing. Easy maintenance of student activity assignments.

Options for the teacher to communicate with students:

- text information (chat) of the teacher with one ore more students,
- audio information of the teacher with one or more students (the headset equipment)
- students do not have to feel confined in front of the whole class, when thay need help they sent private message to the teacher by using one button,
- tasks assignment, tests or files to the students and collection before the end of the lesson.Easy distribution and collection of the files or finished tests. The program takes care of storing them in separate directories for each student.
- asking students or setting up a conference for the students to communicate about certain information,
- with the use of DNS server the option of distance learning (student, while at home or anywhere in the network where there is Internet connection, can log into the classroom and receive instruction as if he was physically present in the classroom).

Transferring of files:

- the use of the traditional view with the left (the teacher) and right (student) side views of directories and files. Transferring files via "drag and drop"
- in addition to normal copy and file transfer there is a possibility of their recovery after any crash.
- transfer files or cloning Delta.

Full control of the classroom:

- Logoff, Restart or Shut Down on students' computers.
- Security features for students and teachers.
- Possibility of long distance installation of the programs and many other features.

NetOp School is a combination of fifteen powerful tools for use in the classroom.

The most important for the teacher are:

- Please note! To delete the contents of the screens and lock keyboards for student computers. This function returns the student to watch the teacher's interpretation.
- lecturing of the new study material. The distribution of content or media files from the teacher screen to all student computers.
- Monitor of the student screens to provide rapid assistance for students.
- easy transfer of the files and learning materials through "drag and drop" between teachers and students.
- Supporting of cooperation by organizing classrooms into smaller working groups.
- conferences in real time. Creating of monitored discussion groups using text or voice communication.

The most important tools from the students' view:

- Asking the teacher for help by clicking on one icon.
- using voice or text communication with other students during lab or group work.
- easily transfer of files via "Drag and Drop".
- Presentation of finished work to other students.

Even administrators who want to have control over the operations or teachers of other courses can use NetOp School. Using Give demo (lecture) with the use of multimedia products in real time allows the teacher to centrally control the playback of dynamic scenes, supported by sound using Windows Media Player. These multimedia files can be played on a local, shared drive or from the Internet. Everything is happening before the eyes of students on their

monitors. Also distant students can watch instructional video accompanied by an interpretation of the instructor. To transfer audio the data communication (VoIP) is used instead of the previously used phone.

Summary of options of the program NetOp School

- Improved job outcomes in education.
- Easy handling of work with the program without computer literacy.
- Wider possibilities using existing network.
- Monitoring student activities, without them knowing it and without leaving the place by the teacher.
- Only investment into the program, no need additional hardware (HW).
- Cutting out any server installation.
- Low network load, carries only video and keyboard commands.
- Possibility of working in a mixed environment (Network protocols TCP / IP, IPX and NetBIOS).
- ability to switch between different classrooms and protocols.
- Excellent cooperation with the terminal server.

Program NetOp School can be classified as a distance learning tool with synchronous form of distribution through e-learning, it can complement very appropriate asynchronous forms and also learning management systems (Learning Management System - LMS). Synchronous form of communication allows participants learning at the same time (the same place is not a requirement). Teacher interaction takes place through media and other interactive applications.

In recent years there have been major changes, except for less substantial changes in appearance like icons or buttons. These changes are:

- Setting access (or ban) for students to some applications, files or Web pages.
- There are new possibilities to record and playback sessions or activities from the screen of any student.
- Dynamic planning of upcoming lessons (layout posts, files, multimedia demonstrations, notes on the interpretation).
- Use of multi-monitor option arrangement.

- Improving the quality of voice communication between teachers and students (16-bit, full duplex) communication and promotion of visual perception using web cameras.
- Install a teaching module on removable media (USB key).
- New interface for distributing files between teachers and students.
- New communication profile for connecting wireless student laptops to classroom.
- Improving the transfer of content of the screens and increase the recording speed.
- Class management module was added (with automatic connection, according to information on the courses, participants and lessons in the central database).
- And there is test centre with tools for generating, implementing and evaluating tests. It is possible to use various information sources (external files, links to web) the asked question create different types of questionnaires according to questions, set time limits on individual issues or comprehensive test, to obtain information about the progress in developing the test, view results of the test of the whole classroom or from each student will automatically test to evaluate the possibility of immediate information to students. NetOp School Test Center uses open standards (XML, XSL, HTML) to keep the synergy between the various similar systems, according to IMS recommendations.

Program in Slovakia has been used solely to support teaching in the classrooms with computers. However, it is also ideal for virtual learning scenarios where the teacher works only with fewer students in real classrooms and other students may connect from different places (student house, home, hospital, etc). These students would have the same communication opportunities as students sitting in classroom. The program was designed by professional educators and it can be managed in few minutes. Its properties concerning the organization of work with the class help the teachers to manage the class with more students. The program became an integral part of computer classes throughout the world and is used on hundreds of thousands of computers.

By using the program School the teacher can prepare (through the installation of the USB Module Teacher),at home, materials, web sites or programs to run during the upcoming lessons; during the lessons teach without unnecessary delays; and monitor all activities of students on computers; assist

with problems solving; and finally distribute the tests and immediately analyze and evaluate them. The entire evaluation process takes only a few seconds, and the teacher and students know the outcome.

1.2 Examples from the Pedagogic Faculty of UMB

By implementation of NetOp School program the efficiency of education in computer labs at UMB has improved. The utilization of existing hardware has improved without any further claims for investment in equipment. The computer labs allow the teaching of other subjects not directly related to information and communication technologies thanks to the fact that the program is easily manageable also by the teachers who are not computer experts. Computer of the students are interactive whiteboards, where students follow a new interpretation of the study material, deal with various instructions, or cooperate with each other or with the teacher. By using this program the efficiency of teaching has not only increased, but students are more active and focused, and they absorb new information easier. Education using NetOp School allows to present a multimedia presentation with all their attributes and can be applied in three basic forms:

- presence form in the classroom (student and teacher physically come into the computer classroom),
- on-line (without physically visiting the computer classrooms),
- combined.

All three forms of education are successful and the conditions are that the trend will continue to accelerate. During the academic year 2003/2004 (and other), the program became popular tool for teachers as well as students. Thanks to the function (Give Demo), where you can define screen for everyone, the concentration and the activity of the students has increased. The student can present their results to the colleagues and lecturers. When the mistake accurse the possible corrections from colleagues and teachers can be implemented with immediate feedback, which is most efficient and ensures a high efficiency of education.

The results of students in the interim and final verification of knowledge through a knowledge tests were interesting. In the experiment we used two out of the three possible forms above. In the first group we used the presence form (teacher and students were in the computer lab) and the second group was combined (the teacher was at different place). 10 study groups of 9 students participated during the experiment and they could use all available materials. When using presence form of study there were 5 working groups

of 9 students which had to deal with the test while the teacher was with them in the classroom. The second group dealt with the same test without the teacher's help. The teacher followed the test via a remote computer using Mosaic View a Monitor Students function. Given the difficulty of the test and the time factor we assume that there was no mutual assistance among students. The comparison of the test results between the groups was remarkable. Better results (14.98%) were achieved by a combined group that worked without a teacher present in the computer lab. The outcome from the data shows the positive detection rate of success in favor of the experimental group (without presence of the teacher) because the value of k> 1.1, which shows the effect of the Huber criterion of educational research and indicates the statistical significance of the variables and baseline data.

The use of the program allowed to enter a knowledge test through the programs functions and also it allow the teacher to monitor the test without being present in the classroom.

While working with the program in the computer labs and also on remote computers (teacher, student), there were no problems and it is undisputed that this product is a promising program for education in the teaching group.

Indication perspective forms and methods of education e-learning, multimedia in distance education at UMB. Here you can apply the most advanced methods of teaching with the support of computer technology so that new knowledge has been processed by the multimedia tutorials. Use of new educational media - networking experience with classical teaching methods and new forms of teaching. Visualization of the core concepts, using multimedia presentations, programs from various sources such as electronic sources, like Infovek project, videoconferencing and so on.

For other options in the education at the UMB, but also at other educational institutions it is essential to create an environment accessible - open outside to the Intranet, thus creating conditions for distance learning by means of ICT, where the program will be a virtual class by the virtual university - Learning Management System.

2. EDUCATIONAL PORTAL AND EDUCATIONAL PROCESS AT UMB

Milestone in the transition from the virtual classes (Netop School) to the software Virtual University - Learning Management System - a system for management education has become the project number 4/2003UMB

Development Project which was lodged on 31.03. 2003, the Ministry of Education, entitled "Using IT as a tool for e-learning (e-learning) at UMB."

The focus of the project was based on the basic postulate of UMB to apply the most advanced method of teaching with the support of information technology so that new knowledge would been processed by multimedia teaching programs (modules and courses) that combine text, image and audio information. This information may be distributed on CD, via computer networks or combined methods. In addition to distribution of information in the form of multimedia e-learning courses the system must also include mechanisms for collecting of feedback and its evaluation. Course participants and coordinators would have almost immediate feedback on the success of the implementation of the work.

The basic requirements for virtual learning system (Virtual University):

1. Cross-platform system capable of operating in MS Windows and UNIX and the ability to log into the system through a variety of browsers - MS Explorer, Netscape, Opera
2. Stable and secure system – immune system against hackers and intervention by the users themselves.
3. Transparent system - simple and logical control system for all the users: administrator, teacher, student, guest.
4. Compatible System - transfer data to other applications, in the future the possibility of linking with the University Information System (AIS), trouble-free operation of tutorials from other suppliers - Zoner, Adobe (Macromedia) Flash
5. The system should include:
   - transparent and comprehensive manual for work and maintenance, as well as all the applications contained within
   - quality and easy to use application for creating multimedia tutorials and tests.
6. The system should allow students to:
   - cquire basic information about the study, to be able to choose from a range of their assigned courses, sign up for consultations and tests,
   - two-way communication with tutors and other colleagues through discussion forums, chat, video conferencing,

- e-learning courses to study and perform tests on-line, with subsequent transfer of the results obtained in the educational system
- send seminars and other kinds of work to your lecturer.

7. Program as a system should allow the teacher and/or the creator of the courses to apply comfortably their materials for teaching that are created in the form of office products, MS Office (Word, Excel, PowerPoint), video, animation and so on.

Based on the recommendation of the Committee the winner became the program for distance education of the students Enterprise Knowledge Platform Silver 3 (hereinafter EKP). The program was purchased with unlimited time license. EKP Silver Software was delivered in two languages - English and Slovak. Interesting point of the contract was: "The vendor ensures stability, security and protection against attacks of EKP and unprofessional intervention by the user."

2.1 Learning Management Systems "Enterprise Knowledge Platform, Silver"

is a powerful learning management system (LMS) designed to meet the requirements for e-learning for local, regional and global organizations. EKP manages the entire learning process - from enrolment of students and monitoring of their learning process through the delivery and completion of the tests to students in-depth reporting of the training costs. Since this is a solution based purely on web technologies, EKP can theoretically communicate securely in any language which can be represented using the Unicode standard. At the moment it is able to work in two languages - English and Slovak.

Hardware components necessary for trouble-free operation of software were also purchased. After selection and delivery of EKP Silver – the installation of the educational system on a separate server "http://elearn.umb.sk" was carried out and the development tool ToolBook II Instructor was installed, which ensured high quality and easy to use applications for creating multimedia tutorials and tests. During the trial in cooperation with the supplier we have made various modifications and improvements to the login page and subsequent pages. We added a photograph of colour panorama of Banska Bystrica to the login page with the logo of the University and the login page also includes a link to all faculties and rector of UMB. For university staff it is suitable good home page. Also the self-registration feature was added as well as many other changes.

Full localization of the version of e-learning management system Enterprise Knowledge Platform - Silver 4 (hereinafter EKP) at UMB took place on 25 February 2005. The update was based on previous versions of EKP Silver 3, which ***the proper mode of operation began on 21 August 2004.***

Groundbreaking date for the project was 21 August 2004. On this day the project began regular operational mode e-learning portal "elearn.umb.sk" at UMB in Banska Bystrica. At PF UMB, FPVaMV and FPV UMB during the pilot implementation the production of modules, courses, tests and others already started.

This electronic learning support for students and teachers meets the primary objectives of education and training within the meaning of the Concept of Development of Education and Training in the SR (the project "Millennium"), the Lisbon strategy and contemplate the Copenhagen Declaration on enhanced European cooperation in vocational education and training. In the same year in March there was a project drafted and submitted to the Ministry of Education to ensure the next stage of development of e-learning at UMB.

The main aim of the project was to complement the educational portal of the current technology development of virtual classrooms. For the operation of such "virtual classroom" it was needed to update the EKP LMS and associated software to enrich the teaching by making digital video recordings of the lessons at a professional level. Also it was necessary to transcript valuable analogue videos into digital forms and making them available via virtual classrooms or through the tutorial module "VIDEO" academia.

For the application and use of virtual classrooms with valuable lectures and courses and for the development of applications we purchased software and hardware - peripherals, video camera, accessories for video camera, and we created a simple semi professional video studio. Also it was necessary to update the LMS EKP program with new tabular views of latest functions.

Creating of new tabular environment for EKP LMS includes:

- Editing of cascading styles of the environment LMS EKP.
- Creating and editing of the standard graphic elements and styles EKP LMS under the new proposal.
- Amendment of the login portal sites - the implementation of the news on the login page, the possibility of self-registration only subject to the approval of the application for registration.

In this project we have also created the possibility of live online help for registered participants of EKP using NetOp On Demand Remote Control. Troubleshooting on individual computers is fast and controlled by their users. There is no need to pre-install and run any software to connect your computer to HelpDesk. Temporary session connection with HelpDesk over the Internet is carried out after the downloading of a small, self-starting program from the "Home" user of EKP and service department will immediately see the screen of the user and can interact with it online and if the user allows the HelpDesk may move and use the cursor, the keyboard - or even transfer files. After the session this program will be automatically deleted from the user's hard drive.

3. REMOTE ACCESS TO COMPUTERS VIA THE INTERNET

One of the challenges facing many organizations is to provide prompt, efficient and cost effective technical support for all computer users. The choice of service centers (Help Desk departments) tend to be to create tools for remote control, allowing remote access and control another computer, regardless of whether the user is or is not at the computer. These tools are used to transfer files, run applications or to resolve critical technical problems.

To have such access to the computers the program must be pre-installed on a remote computer - which is now the established procedure. But there are cases where traditional installation of this program and its continuous run on all computers is practically impossible to handle.

Recently there has been growing interest in remote services over the Internet. These services offer the possibility of remote control without any previous problems and financial losses associated with the installation, maintenance and operation of the client program.

Professional staff must be able to quickly respond to incoming requests and to provide technical assistance. In addition, offices of service centres usually have no influence over the technical equipment used by users, which results in problems with connectivity through firewalls that protect most current computers.

The answer to all these questions is the long-distance support f on request. In order for qualified personnel to enter any computer on user's request the program NetOp On Demand Remote Control (hereinafter referred to as NOD RC) needs to be installed. This program allows ***to provide technical assistance in response to user requirements*** wherever there is Internet access.

The program is also safe; the settings offer the required level of encryption, 256-bit AES encryption and routing traffic does not use any third-party servers which ensures resilience to capture data during remote sessions.

The use of remote access options does not require any preinstalled and running of a permanent program on the remote clients' computers. After the session the program automatically removes all program components from the computer terminal, which eliminates the need for maintenance, upgrades and services and the installation of the latest applications.

3.1 Advantages of remote support via Internet

If the technical support centre has the option of remote access, it has many advantages. Correct and quick problem resolution increases user satisfaction and also increases user productivity and overall efficiency.

The support usually requires a lengthy and complex diagnostic process during which the end user is required to provide all necessary information, settings or files and sent them to the Support Center. However, often when users are experiencing issues they tend to get slightly frustrated and without realizing it are unable to provide prompt and accurate data, hence solving the problem is delayed. Generally, considerable amount of time is spent on understanding the problem.

However, when using remote support the situation changes. The Support Centre personnel who accesses and controls the remote computer is able to see the problem and error messages, he is able to find the information and change settings or guide the user through the correct procedure and usually resolves the problem while connected to the remote computer. In addition, the user can see everything that is happening on the computer while these activities are being commented by the centre personnel. This increases the value of such support. The users' problems are dealt with while they wait in a single interactive session.

The Centre's staff is able to solve problems with fewer telephone calls and at a fraction of the original time and thus they are more available to other users. This means that even the users spent less time solving their problems.

3.2 The solution suitable for organizations

When selecting the remote access via the Internet it s important, for organizations, to consider their demands for safety, flexibility, scalability and speed. NetOp programs, in solving the remote control, has a long tradition and history of challenging the world market and NOD RC program continues

this tradition by providing secure remote control and overcomes the barriers typical of traditional support for users.

The program is orientated for larger organizations to support their end-users through a dedicated link to the website. After the connection with the centre the end-users request the assistance support from the centre whenever they need it. Through this link they download a small temporary application to their computer. Sessions are being launched by the user computer using the HTTP protocol. During the connection it is possible to use text chat (chat online) in real time. '

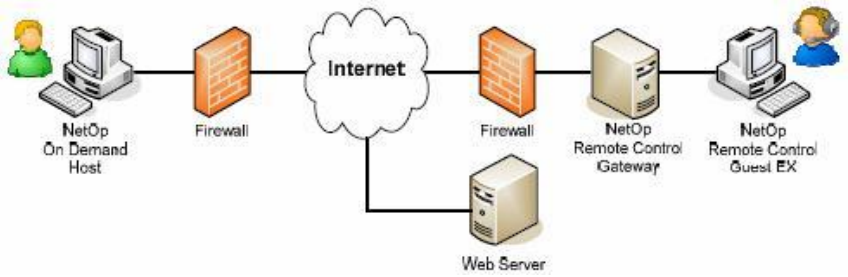

Figure 2. Relation of connection

Source: Prospectuses, NetOp, Birkerod-Denmark

The end user may terminate the session any time and can also set up different levels of remote access.

3.3 Benefits of NetOp On Demand RC

The end user does not have to adjust his firewall or have administrator's rights to be able to run the client host and does not have to worry about any security risks.

The program is a powerful tool for implementing internal and external technical support, administration and management of networks systems because thanks though Guest EX it uses the same interface as NetOp Remote Control 8.0 Guest. Traditional remote control session with the installed client Host can be done concurrently with sessions on demand.

4. ADOBE CAPTIVATE EVLP

is the tool for easy creating of interactive presentations of software products. New features of Captivate include visual synchronicity for adjusting of timing, it is ideal for audio editing, re-defined templates and more. It is

suitable for creating electronic presentations, online help and demonstration. Captivate is certainly more than a demonstration tool and its name (in English captivate, attract, fascinate) captures the real meaning of the product, which creates a pleasant and interactive e-learning environment for each learner.

Captivate is a program that can easily create professional, interactive demonstration (simulation) in the format of Adobe Flesh, with no minimum programming experience or experience in creating multimedia programs. We can automatically record sequential procedures of the screen. These include automatic editing mouse actions, text subtitles and recorder by click on the left mouse button. Added e-learning interaction as a real field data can enter and modify them according to their wishes and desires. Captivate program creates files of a small size with high resolution - these programs allow fast application procedures for training. Very appropriately they may supplement electronic user manuals and allow demonstration of the products online.

4.1 Creation of interactive simulations and software demonstrations.

Everyone can work with the program and can be surrounded by fascinating concept of Captivate. Create interactive simulation - software demonstration can be created by everyone without qualification or being multimedia designer. It is very easy to learn how to instantly create and run own procedures, which saves time and also optimizes the time of consultation.

Records can be created very easily. Captivate shows on the screen monitor everything of the web-based applications with the possibility of simultaneous audio recording. After the start of the recording the program immediately begins creating Captivate demonstration or the entire interactive simulation in Flesch format.

This is automatically generated by the making the choice of the initial image and by starting of the recording.

The program remembers simultaneous continuity without further follow-up activities and programming. The recorder will automatically remember the mutual overlapping of images with instruction of feedback during the recording, also complete recording of an interactive points by click on the mouse. It includes procedures and evaluation of the branches without further registration. The content can be delivered through the Flesh file for an online demonstration, distributed on CD or as a Microsoft Word document for a printed brochure.

Content page can created quickly, if while recording and editing we use of multiple automatic features. Each image can be edited individually, and each

object can be modified, stored, or its size can be modified by a simple mouse click.

Do not repair records and do not worry about the mistakes. Procedures of the mouse can be easily changed, each screen is fully editable and if the images are different, we can convert or correct them. Also if you do not understand the meaning of audio recordings, we can quickly change it by the internal audio editor.

Minimize the input from the keyboard. Captivate can automatically create editable text subtitles and add emphasis on the screen at each step. To integrate audio recording (spoken word, sound, music) we can be directly while recording spoken word with the movement or recording after recording of the image, or we can import existing audio files. Synchronization of audio recordings of the cartoon animation can be done by dragging and dropping the recording in the visual sequences.

Application of the recordings. Importing of existing content can be made into various formats, including SWF. FLA, AVI and others. Captivate also supports SCORM 2004, SCORM 2.1 and AICC. Simple dislocation simulations can also be implemented through some LMS (learning management system - allows the EKP). Additionally, Captivate projects can be fully integrated with Breeze, Authorware, and Questionmark Perception and stored as utilities.

Keep the concentration of the listeners. High-efficiency of the simulation is provided by easy connection to the audience, interactivity and rich media possibilities of the project. The multiple interaction of content that can be placed into simple images enables comprehensive, realistic simulation.

It includes interactive exercises and tests. The learner is able automatically practice current procedures induced by instructions. Test is carried out by clicking on the mouse on the file of information entry fields with lots of correct answers and options and repairable experiments. Final test results can be communicated through the LMS or using set-up e-mail.

4.2 Adobe and licenses of EVLP EDU

Adobe Company seeks to promote education. The company offers its products to schools on preferential terms through the **EVLP** (Education Volume Licensing Programme). Interested community, student, teacher and other non-commercial educational institutions may use the offer of **Adobe EDU licenses.** For more detailed list, visit http://www.adobe.com/education/index.html. Adobe EVLP license may only be used for the purposes of the standard teaching. In case of any commercial activities (eg,

paid courses and distance below) the schools must purchase a **commercial version of the software.**

EVLP license is a very convenient way of buying software for schools. It works by a separate license purchase, installation CD and manuals. The school may buy within EVLP any number of licenses of these products, if the school wants to purchase more than one license it is preferable to buy EDU license. Products purchased under EVLP are not possible to upgrade given the low price. EDU licenses are intended not only for schools but also for students, teachers and other non-commercial educational institutions. For schools, however, in most cases it is cheaper to purchase EVLP licenses.

CONCLUSION

What are the prospects ahead of us in the up-coming years? University and school system, in general, will continue to search for programs to improve education by using technology to bring to the teaching and learning positive outcomes for students and teachers.

With proper access to new technologies and encouraging their use the teachers will be able to better explain complex concepts and the students will understand more. The teachers will provide the students with appropriate information resources and meet their needs. All this could happen at the time of cutting on spending on education, only through the use of new technologies that will enable teachers to cope with growing numbers of students in the same physical layout of schools.

The growing interest in learning also calls for effective implementation and the practical aspects of e-learning. The next growth and expansion of methodology in e-learning will depend on how more and more organizations will understand the success of the implementation of e-learning that is capable of producing the required educational and economic outcomes.

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VISUALISATION IN MATHEMATICS TEACHING – SOME EXAMPLES OF SUPPORTING THE STUDENTS' EDUCATION

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Abstract*: Teaching mathematics at school or university, due to time constraint, implies the need to build new mathematical content on incomplete foundations. Calculations and drawing graphs in the traditional way are often very time-consuming and less precise. Interactive nature of work with computer, speed and precision of the calculations determines that these aids seem to be necessary in the mathematical education. Using computers we can simplify expressions, differentiate, integrate, and plot functions, solve equations, manipulate matrices, etc. At the same time we must remember, that the use of technology cannot replace conceptual understanding.*

Keywords: mathematical education, computer-based mathematics learning.

INTRODUCTION

Teaching mathematics at school or university, due to time constraint, implies the need to build new mathematical content on incomplete foundations. So we have to deal with a problem, how to teach new skills since the previous one are not yet trained. And there is a new opportunity - visualization - a psychological term, meaning the state of enhanced generation of productive ideas. So the use of visualization is an element of mental (psychological) support to the teaching process. Children and young people are accustomed, from an early age that they are accompanied by videos and interactive animations. They are accustomed to understand the message hidden in paintings and graphs, while understanding of descriptions and texts is much

more difficult for them. Adding multimedia to the mathematic courses makes them more attractive to students, and at the same time increases the chances for a proper understanding of the presented problem.

The research on using multimedia in mathematics teaching are conduct all over the world. For example, the research carried out by MIND Research Institute (non-governmental research institute in USA) proof how worth it is to use pictures in explaining mathematics. In Orange district in California using the mathematical multimedia during lessons double the number of positive tests' grades.

On the market there are more and more products using multimedia in teaching.

When students don't have to make long calculations or manually draw graphs, we have situation, that is characteristic for the practical use of mathematics in various fields of science and industry, where the mathematics becomes a tool, a mean to achieve another purpose.

1. THE ROLE OF A TEACHER AND TECHNOLOGY IN MATHEMATICS TEACHING

The proper teaching of mathematics requires the development of at least the theoretical framework and – what is very important - their specification in practice. The knowledge passed down through various electronic forms and coming from different sources allows for better assimilation of information, understanding the needs of the algorithmic thinking and the proper conduct of reasoning. Meanwhile, calculations and drawing graphs in the traditional way is often very time-consuming and less precise. Many times, this makes it impossible to discover sought dependences or to quickly understand graphical interpretation of discussed concepts. Interactive nature of work with computer, speed and precision of the calculation determines that these aids seem to be necessary in the mathematical education. Additionally, the work with tools of this type provokes to ask questions. The answers to these questions lead the learner to discovery of the mathematical knowledge.

The teacher has the duty to accompany and direct the students at their partly individual voyage of discovery through the world of mathematics. Using computers we can simplify expressions, differentiate, integrate, and plot functions, solve equations, manipulate matrices, etc. But we have to remember, that it is not technology that changes teaching, but technology is a catalyst for teachers to change their teaching methods and focus on topics and

skills, aiming at a better teaching of mathematics. Technology is an essential tool for teaching and learning mathematics effectively. If technology is used properly, it leads to

- more efficient teaching and learning,
- more student activity and creativity,
- increased importance of the teacher.

In the process of mathematics education the role of a teacher is very important. With new technology, students are expected to abandon their traditional paper-pencil practices and discover mathematics on their own. A good mathematics education will use a calculator or computer like language education uses dictionaries. When a computer is employed as a tool, it helps them to hypothesize, test their hypotheses, and derive generalizations. In so doing, the students may reflect on mathematical results, apart from taking the same steps as those of a mathematician in reaching mathematical results and what is very important, developing unique thinking styles.

2. TEACHING WITH TECHNOLOGY

As we know, the new ways of communication had great cultural impact on many aspects of our living. Soon we will have tools, which enable us to get every needed information in any form at any time - through TV screen or mobile phone. Digital revolution is an impulse to change the way of teaching and methods of learning. Obviously the new technologies will not eliminate or replace all the traditional teaching methods. There are many reasons of that. We will concentrate on two of them , the most important for this article.

First of all, mathematics has its own language and notations, requires specialist communication. Using only widely available editors to type mathematical notations on computer keyboard, to do calculations in electronic form or to communicate remotely with a teacher is not easy. This is one of the main reasons, which makes difficult to conduct classes with using new technologies. Computer programs which we use in educational process should have an intuitive user interface. The various programs to specialist engineering calculations are introduced to students in the later years of study. Meanwhile the mathematical education is most intensively introduced in the first year of study, when the technical university students' knowledge of mathematical notations is not sufficient. Teaching mathematics via Internet is much more difficult than teaching the humanities sciences because of the poorly adjusted text editors. In this article we will focus on some examples of

using the computer software to demonstrate the path of solution for same mathematical problems. We want to show how this can support the traditional way of teaching mathematics.

Secondly, the replacement of some skills by the use of new technologies may cause some troubles in the next stage of education. For example, division of polynomials or drawing graphs of functions can be easily done through an easy-to-use computer program. However, the question arises whether an engineer who is not able to do the basic algebraic transformation in traditional way (without the use of new technologies) will know how to solve a simple engineer problem. Apart from the above there are many other benefits and risks posed by the use of computers in mathematics education which we will not mention here.

Nowadays, due to the changes in the school curriculum, more advanced mathematical analysis or algebra have to be presented at university for the first time. If our students want to be good, competitive engineers in the labor market, they have to know many, sometimes very advanced mechanism of mathematics. First of all they must have a solid theoretical foundation and create the right intuition of basic mathematical concepts and their combinations. Here the new technologies, used properly, could be a perfect support. Visualization, the computing power of computer and more and more functional software can be a great complement to traditional teaching. It will allow to create the right mathematical intuition, will help do the tedious calculation. It also will give the opportunity for the best students to expand their knowledge and at the same time help those less talented in mathematics. Wisely used computers in students' education teach them to be flexible and to have an open mind in using new technologies. We can show them that thanks to the recommended by the best universities free software they can focus on solving more advanced mathematical problems. For example, if we want to show how to integrate certain rational functions or how to find inverse Laplace transform we can use the suitable program to divide polynomials or to find the partial-fraction representation of rational function. So we can concentrate on new, more interesting issues not on time consuming, already well trained calculations.

2.1 Examples of using the computers in mathematics education

After almost forty years of using handheld calculators, we have learned some fundamental principles about the use of calculators in the teaching and learning of mathematics (in 1972, Hewlett-Packard introduced the remarkable HP-35, the first "scientific" calculator that evaluated the values of transcendental functions such as log 3, sin 3, and so on). Now computers,

laptops, palmtops and mobile technology enable many kinds of useful programs to work during educational process. Computer technology in mathematics education allows the students to find many opportunities for investigating mathematical relationships, hypothesizing, and making generalizations. A lot of software programs can perform higher-order mathematical operations, quantitative and symbolic calculations, and 2D and 3D graphical representations. For example students can see the relationships between graphs, transformations, and equations of functions. Computers can offer

- less passive learning;
- less time on manipulation;
- more modelling and problem-solving;
- less note-taking and listening to teacher and more discussion with peers and reflection at the same time.

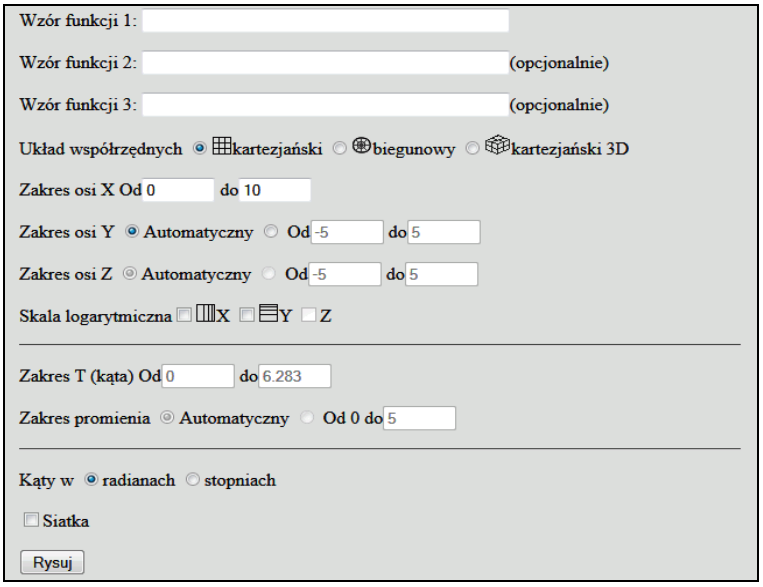


Figure 1. Model of application for drawing graphs of function.

Source: http://www.wykresyfunkcji.pl/zaawansowane.php

In our university in basic students education we started to use Scientific WorkPlace (network version). We use this program, because it combines the ease of entering and editing mathematics in natural mathematical notation for students – they can enter mathematics and perform computations without the need to think or work in a programming language. However there is many,

also free of charge, computer programs that support visualization, perform the transformations and mathematical calculations. In this article we have used only these kind.

We don't want to convince anybody to the certain type of software. Due to the widespread access that students have to laptops, PDAs and other mobile devices it only depends from the teacher and the available at university equipment which program to use.

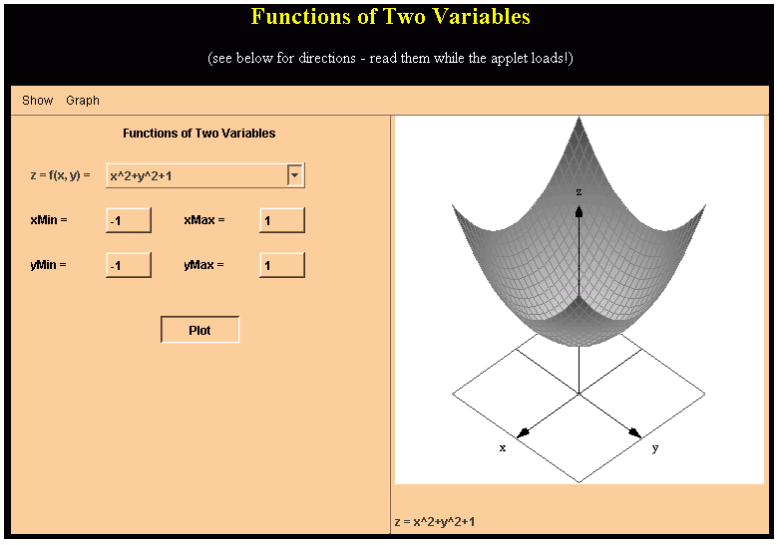


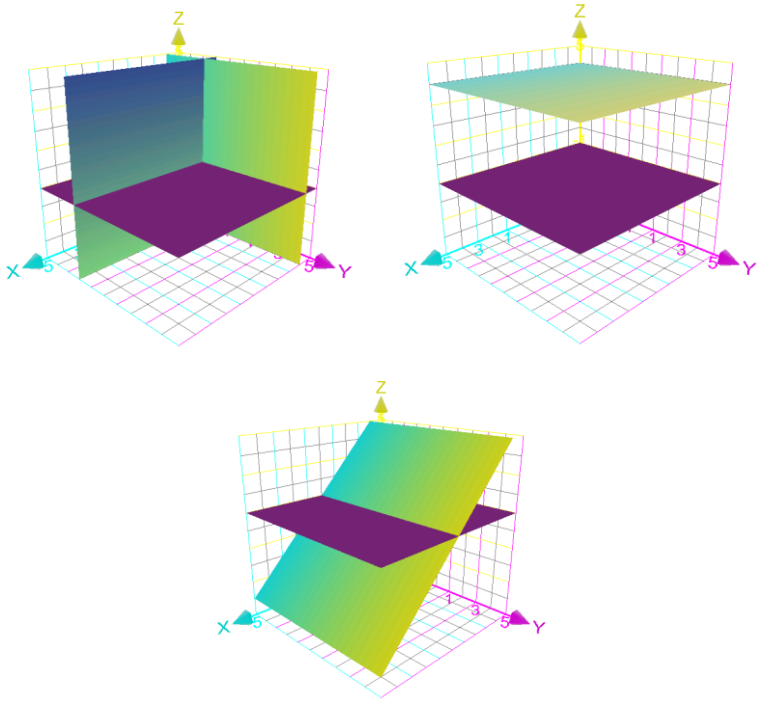
Figure 2 Example of interactive applets available on MIT's website.

Source: http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/tools/tools22.html

2.1.1 Planes in the space and linear equations

As first example we present simple problem that concerns solving systems of linear equations. When this subject is shown without the references to the basic knowledge from analytic geometry, for an average student is hard to understand (" to see") even the simplest system of two equations with three unknowns. But if we know, that each equation illustrates a plane in the space, the solution of the system reduces to "the geometric" question- "How two plane can be located towards each other in the space?"(Fifure 3) When we look at the problem from this angle, it is easy to notice that the system of two equations with three unknowns doesn't have exactly one solution (two planes in the space cannot have exactly one point of intersection). For a good student algebraic transformations are not a problem, but the average one needs the guidance showing the connection between "the word of symbols"

and " the word of geometry".



Fifure 3. Planes in the space (Graphing Calculator 3D ver. 3.2).

2.1.2 Polynomials and solving polynomial equations

Compare finding the real and complex solutions to the simple cubic polynomial equation $x^3 - 7x^2 + 17x - 15 = 0$ by paper-and-pencil methods with using a calculator-based graphical or numerical method. Before calculators, we often asked students to solve only contrived problems. Calculators and computers allow students to apply more-general types of solution processes even to problems that have no exact solution or to problems that cannot be solved by traditional paper-and-pencil methods alone.

2.1.3 Functions and their graphs

Computer programs used to draw graphs of function, not only help to show the basic characteristics of lines or curves, but also could illustrate more advanced properties of graphs and their modifications.

We can start from easy example – "are the functions $y_1 = 2\ln x$ and $y_2 = \ln x^2$

identical?" By graphing them on your graphing utility, you will see that their domains are different. It is true that 2 lnx = $\ln x^2$ but with the assumption x > 0.

So students can noticed that the familiar properties of logarithms, such as ln a^b = b ln a and ln(ab) = lna + lnb must be applied with care.

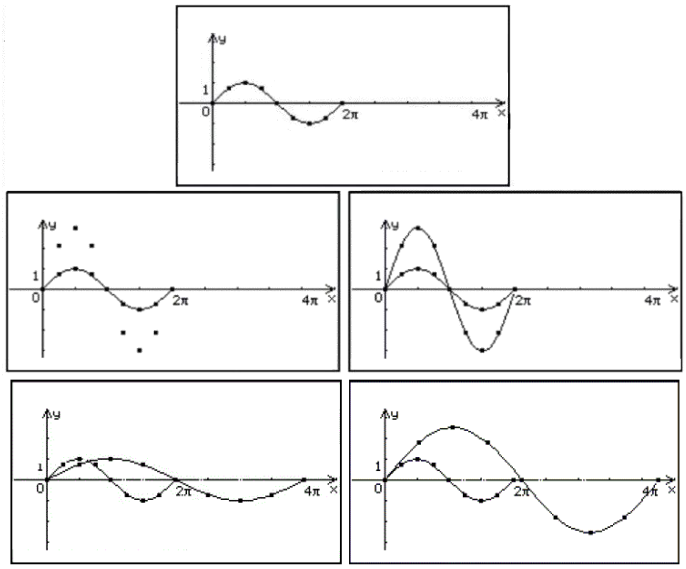
When we first introducing the inverse trigonometric functions, we can use different graphs of the trigonometric functions to show the restriction of the domain needed to define the inverse function.

The functions f(x) = sin x and g(x) = arc sinx are inverses of each other. Does that mean that their composition is the identity function? The graphs of y_1 = sin(arcsinx) and

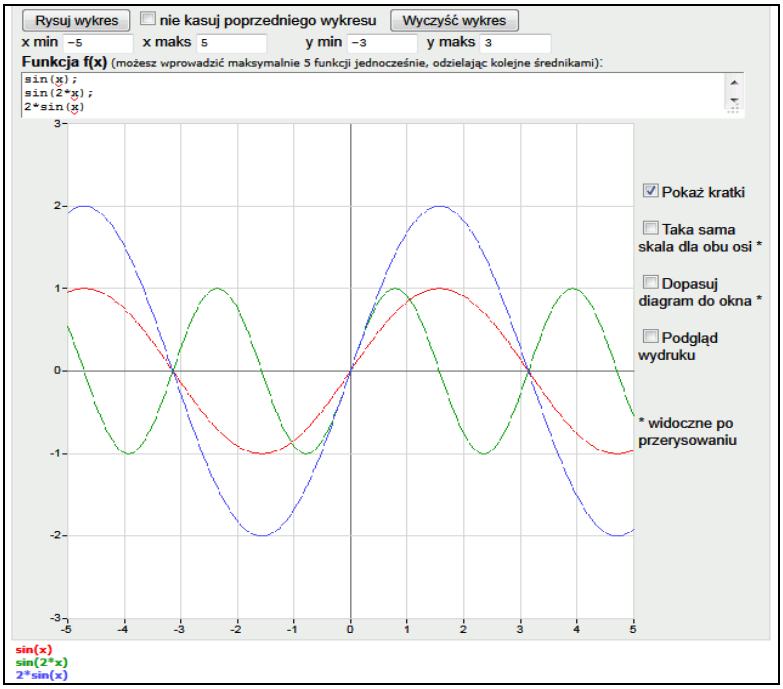
y_2 = arcsin(sin x) tend to surprise our students – graphing utilities force us to think about domains much more than before. For example, we can calculate different values of

sin(arcsin x) – it can make a lot of reflections too.

Another example – in the function y = a sin(bx) , observe what a and b does with the graph.



Fifure 4. Graphs of y=a sin bx for different values of a and b made on graphing calculator.



Fifure 5. Graphs of y=a sin bx for different values of a and b made by online application

Source: http://www.jogle.pl/wykresy/

In this way the students' understanding of graph of the sine functions is deepen and better, especially the effect of a and b on the amplitude and period of the graph.

2.1.4 Rational functions

We compare graphs made by traditional paper-and-pencil calculus methods or using a graphing calculator with graphing the function using a computer. The traditional methods for "graphing" include only finding the domain of function and the derivative $f'(x)$ and solving the equation $f'(x) = 0$ by paper-and-pencil methods. Using a graphing calculator can generate some problems. For example some students believed that the graph of

$y = \dfrac{x+1}{(x+2)^2}$ had a minimum turning point at x = -2. These students failed to realise that the function is undefined at this x value as they completely misinterpreted the graphs displayed by the graphing calculator and neglected to inspect the equation (Fifure 6). Here students begin to build their own intuitive understanding of the behaviour of different classes of important

functions.

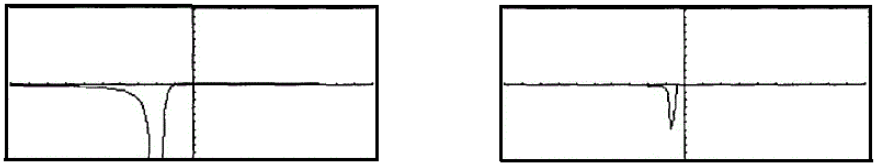


Figure 6. The graph of $y = \dfrac{x+1}{(x+2)^2}$

If we use the computer program this kind of mistake in reasoning is less likely due to the better quality of visualization.

2.1.5 Game length paradox

This is an example when the tedious calculations may overshadow the true meaning of the problem under consideration.

Let us recall what the game length paradox is. The player gets one point for each winning round in the random game. The player also has to fix the even number of the rounds to play. For example, the probability of winning every round equals to 0.46. When the player gets, in all rounds, more than a half of the possible points, he wins the game. How many rounds to play the player should determine, that the probability of success is the highest?

If the number of rounds was any natural number, the player should choose the game with round's number equals to 1. Unfortunately, the player can choose the round's number only form the set of an even numbers. Then the result is affected by whether a single round is a win (the probability of failure in a single round equals 0.54, thus the game is the unfavorable).

It turns out that when the Bernoulli's formula is applied to solve this problem, we obtain the following values for the selected sequence of increasing even natural numbers:

Table 1.

Probability of success for even number of attempts

Number of attempts	2	4	6	8	10	12	14	16
Probability	0.212	0.255	0.272	0.28	0.283	0.2843	0.2841	0.283

When the number n increases further, the values of the probabilities decrease.

If we changed the conditions of this problem and assumed that the probability of winning in a single round is 0.45 (so, it is less about 0.01 than we assume in the example), then it turns out that we should select 10 rounds of the game to play. Therefore, the hypothesis that "if the game is unfavorable, then the shorter the better" would be wrong.

2.1.6 Understanding exponential growth

One of the less well understood concepts related to the exponential function is the concept of "exponential growth". We can use a computer to compare the graphs of given functions. For example first we can consider graphs of $y = 2^x$ and functions $y = x^2$. If we draw these graphs at the same time we may get a very strange answer. If the domain is [0,3] we may be surprised to get the exponential under the power function. If we choose a large interval like [0,100] the power function disappears.

Now we can conclude from the graphs, in not formal way, that at some points the power function "grows" faster than the exponential function; this one only "grows" faster for very big and very small values of x. Then we can make the same conclusion using the derivative of each function. So "big" does not mean "grow faster" and "exponential growth" is only a big growth for "big" values.

But if we try to compare the graphs of $y = 2^x$ and $y = x^8$ things get more complicated – the exponential is clearly under the power function. It will be much more difficult to get a domain and range where we will be able to see the exponential function crossing over the power function. (Figure 7)

It will be impossible to view the two intersecting points of the two graphs unless we use a log scale. This is surely the occasion for discussion about what can be concluded from the graphs we can draw by hand and these plotted by a computer.

This way we develop in students the right intuitions and habits related with the mistakes that may occur when we interpret given visualizations too hasty. And as we mentioned, it is appropriate at the same time to use differential calculus to properly justified visualized observations. So we get a nice combination between the theory and the practical calculations.

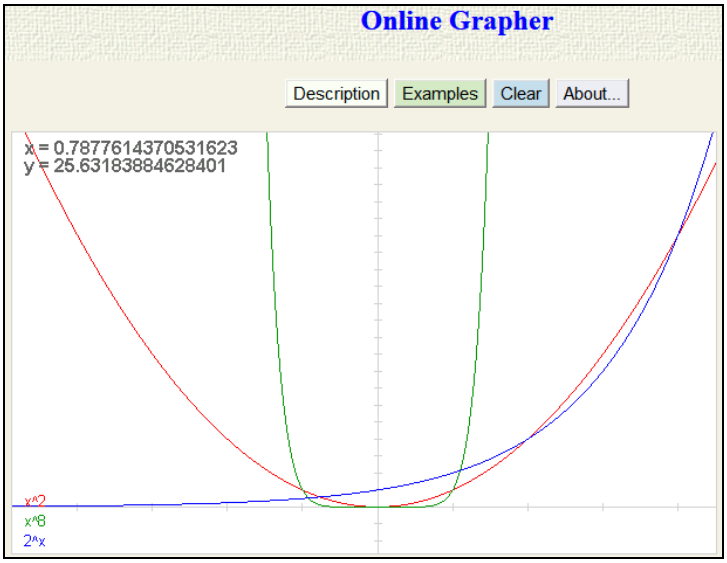


Figure 7. Graphs of $y = 2^x$, $y = x^2$ and $y = x^8$ plotted by application on the Department's of Mathematics of the University of Hawaii website

Source: http://www.math.hawaii.edu/lab/241/online-grapher.shtml

2.1.7 Growth and decay models

Similarly, when we describe growth and decay models, some problems will undoubtedly call for determining the time at which the growing or decaying quantity reaches a certain value. As an adjunct to the traditional symbolic solution of this type of problem, a graphic approach can be used to solve a growth model for t. The computer can also be used to illustrate the graphs of various growth and decay models.

For example the classic Volterra predator-prey problem becomes a easy exercise using a graphing tools. The model assumes the rates of population growth of predator-prey populations (foxes and rabbits) are related by the "highly coupled" first order differential equation system (1) given by

$$\frac{dF}{dt} = (-0.5 + 0.02R)F$$

$$\frac{dR}{dt} = (1 - 0.1F)R \qquad (1)$$

where y = F(t) is the population of foxes at time t and y = R(t) is the population of rabbits at time t (t measured in years). Suppose the initial

populations are changed. How do the population graphs change? Numerical methods are necessary, because this simple system has no closed form solution. We can find by plotting the points (F(t), R(t)) for a few different initial conditions (the beginning populations). The student can be led to conjecture that perhaps there is a set of initial conditions that result in stable (constant) populations over time. This result can then be confirmed analytically using paper and pencil and supported graphically. The graphs suggest that if the starting population is 10 foxes and 25 rabbits then the populations will be stable. This example is taken from "Graphing Calculator Intensive Calculus: A First Step in Calculus Reform for All Students" by Bert K. Waits and Franklin Demana from The Ohio State University (Waits, Demana 1994).

2.1.8 Other applications of computers in mathematical education

We can use animations (for example in Maple) shows Riemanns sums converging to an integral for a given function, using different subintervals.

Many students have the problems with the limit concept, co after introducing L'Hospital's rule, students can check their answers by drawing the graph of the function in an appropriate window. Then the limit concept is a natural one, which addresses questions concerning the appearance of a graph.

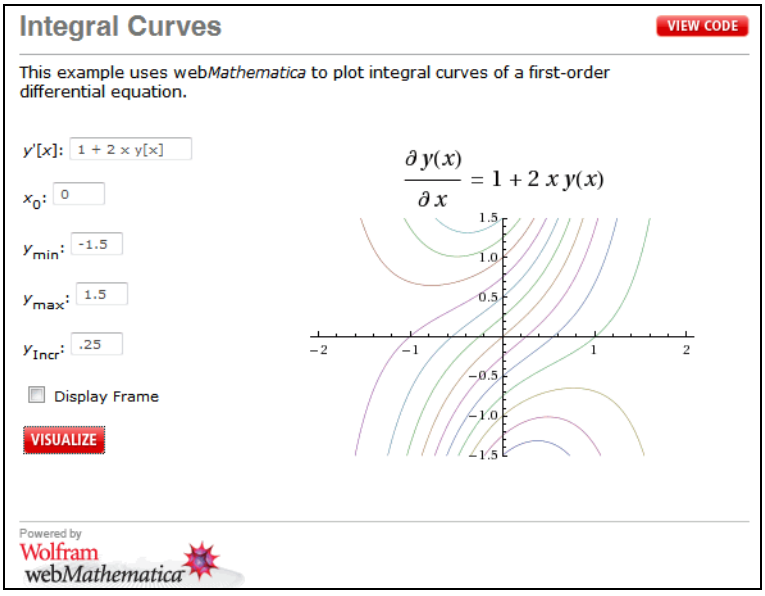


Figure 8 Example from website, offering free online applications, that help to solve problems from different fields of mathematics.

Source: http://www.wolfram.com/

The computer is also an excellent tool for graphing parametric curves in the plane. You may wish to calculate the arc length of a few parametric curves. Although innocent-looking arclength problems can often yield integrals which are symbolically intractable, the computer can quickly produce approximations of such integrals.

3. NEW CHALENGES IN DEVELOPING OF THE KEY COMPETENCES

Nowadays, due to the changes in National Qualifications Framework, universities will create the curriculum and requirements independently, which will make specified learning outcomes. This opens a new opportunities in the use of computers and new technologies in mathematics teaching at this stage of education.

In the scientific journal „Mathematics and computers" (4/2000) Prof. Henryk Kąkol says, that the new technical means have changed the scope of mathematical content that pupil has to learn. He even asks the question "Will the new means cause the removal of further mathematical content from the existing curriculum?". For example, as it was said in previous chapter, the problems with the limit concept of a function or with division of polynomials could be done using the computer. So we have to decide very carefully, which skills could be replace by technological support and when technology should be only a tool to verify the correctness of the operations. And these are the greatest risks associated with the formation of the curriculum directly by universities. On the one hand, this is a great opportunity for the development of new teaching methods and techniques, innovative programs and original approach to achieving educational outcomes. However, it should be noted that this is at the same time a threat to the quality of education. It could create a situation that universities would reduced their costs of education process. As a consequence the effects of the education would be only unrealized items in the course cards. Much here depends on the emerging new system of internal and external evaluation of universities. If new technologies are used properly, it will certainly contribute to developing the quality of education. However, if they become a substitute for the traditional teaching the effects of such action may be even irreversible. The engineers, the future scientists or the teachers badly prepared to work will have bad educational influence on the future society. The temptation to replace a part of the course material is very strong. At first glance, it seems that the new technologies give the opportunity for faster education the larger group of students with a smaller group of teachers. But, as is known, the education process properly prepared

with the new technologies is expensive. Especially this applies technical subjects, particularly mathematics for first year of study.

Finally, it should be noted that access to the media and the appropriate use of new technologies is extremely important not only because of apply them to the process of improving quality and enhancing the attractiveness of education. The students who don't have the possibility of using the advanced tools in learning cannot fully develop skills useful in the modern world. The isolation reduces the chances of graduates in a competitive job market. Currently, the gap between those who have the access to technology and information and those who haven't is growing.

CONCLUSION

Computers can help students in becoming mathematical problem-solvers, and in enhancing their conceptual understanding of analysis or geometry. For example the students improve their knowledge of geometrical concepts and shapes. With new technology, students may discover mathematical relationships with induction, and learn how to easily draw simple or complex figures, analyze them, and express their own hypotheses as a theorem. With the use of the computer students are able to generate a larger number of examples than they would have with pencil and paper. Also, the students are able to view and solve more modelling problems because they could visualize problems better and hence were able to develop their ideas and understanding of mathematics. It gives the students the opportunity to explore more topics and develop their problem solving skills through the use of concrete visualization. Many good ideas for using technology in the curriculum exist. The challenge is to coordinate these ideas and apply them in systematic ways which improve the teaching of mathematics throughout the curriculum. For example Prof Bert Waits from Ohio State University notes that the implementation of new technologies is associated with skepticism and fear of the unknown, but stresses the importance of modern technologies in teaching mathematics and utters an opinion about the reform of mathematics teaching. Students acquire a better comprehension of concepts when these are presented through concrete schemes, numerical or graphical. Technology based on the computer makes this approach available to all students and makes the learning a more active process than the traditional passive process. In our opinion students in technology-based classes:

- placed at higher levels in a hierarchy of graphical understanding;
- got better domain and range concepts and scale issues;

- read and interpreted graphical information better and got more information from graphs;
- better related graphs to their equations;
- linked more often graphic, numeric, and algebraic representations;
- concentrated on the mathematics and not the manipulation
- solved more non-routine problems.

It should be remembered that the foundation of mathematics is logical reasoning and inference. The use of technology cannot replace conceptual understanding, computational fluency, or problems solving skills, but is very important and useful tool in education. We must remember two important goals of mathematics teaching: the development of the theoretical meanings of mathematical concepts and their applications.

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NATIONAL EPICS ON MAIN EDUCATIONAL WEBSITES (POLAND AND AUSTRALIA)

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Abstract: *National epic is an important component of ancient and contemporary national identity. It has been considered, how in the "Podstawa programowa…" and in the portal "Scholaris" are presented ways to work during Polish language lessons with "Pan Tadeusz". Way of discussing "Hamlet" during English lessons in Australian schools have been considered analyzing the content of webportals "The Australian Curriculum. English" and "Board of Studies NSW". The qualitative analysis of documents shows, that "Hamlet" is better and more effectively entered in the expectations and needs of contemporary Australians, than "Pan Tadeusz" in young Pole needs.*

Keywords: national identity, *Pan Tadeusz, Hamlet, Scholaris, Board of Studies*.

FUNCTIONS OF NATIONAL EPICS IN THE PAST AND TODAY

Every national epic characterizes the lives of nation at a certain stage of development. Simultaneously it shows the history of a nation, events important for national identity, national symbols, customs, folklore, legendary or historical and important for all nation historical characters and their mytholigized, heroic and important for the entire nation heroic deeds of heroes and their heroic death. The tragic historical events help to define the national identity due to being ingrained in the mass consciousness. National epic based on historical facts and circumscribes religious beliefs. Therefore *Iliad* and *Odyssey* are based on polytheistic mythology of ancient Greece yet *Hamlet* and *Pan Tadeusz* refer to Christian God. Additionally *Pan Tadeusz* contains references to Polish Catholicism, which at the time of the creation

epic substantially defined the national identity, because distinguished Poles from neighboring nations. It was especially important during enemy invasions, such as Swedish, because defense of religion became a defense of national identity understandable even for those, who due to lack of education did not understand category of national identity.

A national epics is an literary work in the national language, written in an exalted style and sublime verse. Sustains hearts in times of national disasters and mobilizes to defend the national identity. Resembles its former glory and presents its value. Therefore each nation needs its own national epic. They were formed thousands of years. For Greece national epic is

Iliad and *Odyssey* (eighth century before Christ), for France *La Chanson de Roland* (XII century), for Germany *Nibelunglied* (about the XII century), for Russia *Слово о полку Игореве* (XII century) and for Poland *Pan Tadeusz* (1834 r.). Australia is a young country, so borrowed from the English *Hamlet* (1600). Shakespearian drama is mandatory reading for the Advanced level, that is, for the best-educated Australians.

Today national epic are cognized in schools, adapted for the screen and issued as books and recently as e-books and audiobooks. Still contains and express the essence or identity of a particular nation state, ethnic or linguistic group, especially without independence or autonomy, because national epic still express the cultural distinctiveness or national ethos and proud. Is supported by government, because contributes to enhancement the unity of the nation and in the consequence reinforces the power of the state. Therefore national epic is important for world civilization. W J Johnson believes, that *Mahābharāta* is *significant for our self-understanding as the works of Homer and the Greek dramatists (with which it is often compared), the Bible, the Qur'an, or, more recently, the plays of Shakespeare. It is this unversal quality that prompted a recent western theatrical adaptation to characterize it as „the poetical history of mankind"* (*The Sauptikaparvan…*: IX).

1. PAN TADEUSZ

1.1. IN THE CORE CURRICULUM WITH COMMENTS

In *The Core Curriculum with Comments* (*Podstawa programowa z komentarzami*) *Pan Tadeusz* is planned for the third and fourth educational stage (junior high school and secondary high school).

On III stage the main objective of *"Analysis and interpretation of cultural texts"* is: *The student improves the efficiency of analysis and interpretation of cultural texts; gained new tools that make his reading is more mature, more conscious and independent; meets a new genres and literary conventions using the concepts learned in the reflection of the literature and values* (…), *gradually begins to discover the works of classical importance for Polish culture and World* (*Podstawa programowa…*: 35). However the main objective on IV stage is: *The student understands the structure of complex texts; recognizes the meanings contained in the deep structure of text; recognize the functions of text and language resources for their implementation* (*Podstawa programowa…* :43). It follows that the text of *Pan Tadeusz* as a whole was considered affordable for students secondary high school.

1.2. MODEL OF ANACHRONISTIC DYDAKTICS IN THE *SCHOLARIS* PORTAL

Scholaris portal is designed for teachers of all subjects and all types of schools. Its resources include: lesson plans, multimedia presentations, videos, graphics, work card templates, tests, guides. *Scholaris* is equipped with an internal search engine that allows users to find needed materials using the following filters: subject, resource type or stage of educational. Searched term user can better define by the time interval in which it was published. Results are sorted in ascending or descending by date of publication, number of shows or by category.

Scholaris is run by the external, institutional bodies. The leader of the project is Education Development Center (Ośrodek Rozwoju Edukacji) in Warsaw, the Institute Laudator LLC (Instytut Laudator Sp. z o.o.). Portal applications performs the company Young Digital Planet JSC (Young Digital Planet SA), which also takes care of its technical efficiency.

On ministerial website *Scholaris* epic *Pan Tadeusz* is the subject of 14 documents and additionally is mentioned in 4 documents concerning with *Lalka* by Bolesław Prus and *Przedwiośnie* by Stefan Żeromski. These are educational resources, designed to facilitate teachers to conduct classes. One document was addressed to students to help them in mastering factual knowledge concerning the historical events in *Pan Tadeusz*.

Related to *Pan Tadeusz* materials posted in portal *Scholaris* are the most lesson plans. Are also included illustrations, test, work card template and presentation. swf. They are intended for educational stage IV, or secondary high school, because only one document was addressed to the third stage of

education, namely to the junior high school students. The list below includes found materials.

1. Dorota Kurjata *Adam Mickiewicz – "Pan Tadeusz". Historical events and poetic fantasies* (*Adam Mickiewicz – "Pan Tadeusz. Wydarzenia historyczne a poetyckie fantazje*, Word document).

2.Young Digital Planet *Brązownicy* (swf. presentation).

3. Aneta Woźniak *The protagonist of "Pan Tadeusz" – gallery of noble types* (*Bohater "Pana Tadeusza" – galeria typów szlacheckich,* lesson plan).

4. Małgorzata Kudosz *Features of the national epic based on the "Pan Tadeusz" by Adam Mickiewicz and the "Iliad" of Homer* (*Cechy eposu na podstawie "Pana Tadeusza" Adama Mickiewicza oraz "Iliady" Homera,* lesson plan).

5. Olga Żuromska *Time of History – Jankiel Concert* (*Czas historii – koncert Jankiela*, lesson plan).

6. Barbara Myszk *What do we learn from a fragment of "Pan Tadeusz"?* (*Czego dowiadujemy się na podstawie fragmentu "Pana Tadeusza*?*",* work card template).

7. Paulina Bończoszek *Why perception of Jacek Soplica by Gervase is subiective?* (*Co decyduje o subiektywnym spojrzeniu Gerwazego na postać Jacka Soplicy?*, lesson plan).

8. Małgorzata Włodkowska *Perception of two ponds by poet – repetition of study of style* (*Dwa stawy w oczach poety – powtórzenie środków stylistycznych*, lesson plan).

9. Young Digital Planet S.A *Count and Zosia* (*Hrabia i Zosia*, illustration).

10. Paweł Siarkiewicz *What historical events evokes the Jankiel concert?* (*Jakie wydarzenia historyczne przywołuje koncert Jankiela?,* lesson plan).

11 Marlena Karewicz *Representation of the nobility in "Pan Tadeusz" by Adam Mickiewicz* (*Obraz szlachty w "Panu Tadeuszu" Adama Mickiewicza*, lesson plan).

12. Young Digital Planet S.A. *"Pan Tadeusz" – dances* (*"Pan Tadeusz" – tańce,* illustration).

13. Marta Chowaniec *"Pan Tadeusz" – content and problems* ("*Pan Tadeusz" – treść i problematyka,* test).

14. Dorota Kurjata *Adam Mickiewicz – "Pan Tadeusz". Historical evnts and poetic fantasies* (*Adam Mickiewicz – "Pan Tadeusz". Wydarzenia historyczne a poetyckie fantazje,* source).

Additionally search found four lessons plans by Dagmara Zawistowska-Toczek concerning with other readings, but containing references to *Pan Tadeusz.*

1. *What I know about "Early Spring"? Exercises* (*Co wiem o "Przedwiośniu?" Ćwiczenia,* e-lesson).

2. *The presentatin of the family in "Doll"* (*Obraz rodziny w "Lalce",* e-lesson).

3. *Novel and development – the fate of its hero, Cezary Baryka* (*Powieść rozwojowa i losy jej bohatera, Cezarego Baryki,* part 1 and 2, e-lessons).

4. *War and Nawłoć* (*Wojna i Nawłoć,* e-lesson).

After examining these materials the following conclusions arise:

1.2.1. In Polish webportal **lesson plans is the most popular type of the didactic material**. Due to its in webportal *Scholaris* lesson plans about "Pan Tadeusz" dominate. There are seven: 3, 4, 5, 7, 8, 10, 11. Furthermore *Pan Tadeusz* appears as a interpretative context in lessons plans concerning with *Doll* by B. Prus and *Early Spring* by S. Żeromski. Therefore dominated practical guidance for teachers on how to teach. Their creation is based on the tacit assumption that taughted teams are similar and have similar educational needs.

1.2.2. No discussion on religious content of *Pan Tadeusz*. Features of the national epic are mechanically enumerated and there is a lack of consideration about the importance of this text for the identity of the contemporary Pole (4). The examples given are not always didactically relevant, because for example *Tebaide, Farsalia, Jerusalemme liberata* (4) not served as national epic.

1.2.3. Are used old issues of *Pan Tadeusz*, for example from 1979 (5). In some lessons plans is not given the date of the used copy of *Pan Tadeusz* (3). There is a lack of bibliographic studies. The documents do not contain a bibliography (8) or are prepared based on the text *Pan Tadeusz* only. As a source As a source of bibliographical references imprecise adress was entered: http://pl.wikipedia.org (5). Textbooks, which refers to the autors, are outdated, for example *Antiquity – enlightenment* (*Starożytność – oświecenie*) by Maria Adamczyk, Bożena Chrząstowska and Józef Pokrzywniak (1986),

Romanticism (*Romantyzm*) by Stanisław Makowski (1994). Polish national epis is not rooted in the contemporary scientific literature.

1.2.4. There is a lack of references to contemporary reality and experience of students. Polish national epic school interpretations are concerning mostly with history and tradition. Two lessons plans applies to the characteristics nobility presented in *Pan Tadeusz* (3,11), two presents in Jankiel concert historical and important for our nation events (5, 10). It also applies to work card designed for students (1). It do not contain threads of contemporary. The only one lesson plan by Paweł Siarkiewicz devoted to historical events in Jankiel concert contains refernces to the contemporary music well-known to students. So esploring the national epic is dominated by historical and cognitive content.

1.2.5. In the documents **encyclopedism dominates**. Command in the test (13) often refer to enumeration of the elements: noble traditions, types of comedy, national epic qualities, characteristics of the Romantic hero, lead actors in film adaptation. As a teaching methods frequently mentioned are heuristic techniques (3, 5, 8, 10, 11).

1.2.6. National epic is regarded as a **anachronic set of attitudes** and role models. Presented in two documents (3, 11) assessment of the nobility is very similar. In both its advantage are: patriotism, tradition, ability to forgive, solidarity in the view of the danger, bravery. There is a lack of references to the modern understanding of patriotism as an example: engagement with the local environment, buying Polish products, educational and pedagogical impact on the environment, charity, respect for national past.

1.2.7. Disintegrated analysis appears. In word card template (6) is instructed to write stylistic figures from the text, but there is no reference to functions these stylistic figures. Test the knowledge of the content of *Pan Tadeusz* (13) also requires only a measure of poetic without naming its interpretation. According to Bożena Chrząstowska *fundamental error of this teaching strategy is to limit the imagination of students pedantic description of the literary work, deprived of semantic approaches* (Chrząstowska 1979: 105).

1.2.8. In some documents **obsolete vocabulary and editorial defects** occurs. Words *butny, rezyduje, cudzoziemszczyzna* are obsolete, phrases like *piastuje urząd.* Clichés appear, for example *samodzielne refleksje, zajmuje się polityką* (about Stolnik, 11). Such vocabulary creates a language barrier to the text. Makes it difficult to reference *Pan Tadeusz* to the student's own experience. Also distances him from characters important for the national identity. Lacks the vocabulary of contemporary humanities, especially

terminology of literary theory. Typos issued: *wyrazowewraz, sie, awntur, niumiejętność* (11). Missing punctuation marks with enumerations (11) and in the text (*zubożaładrobna, magnateria arystokracja* 11). Noticed a syntax error: *potrafi bohaterom przyporządkować warstwę społeczną, do której należy* (11).

2. HAMLET IN AUSTRALIAN PORTALS

2.1 Approaches to the study of text: *the australian curriculum*

The Australian Curriculum is implemented from 2011 r. Its creation is justified as follows: *An Australian Curriculum in the 21st century needs to acknowledge the changing ways in which young people will learn and the challenges that will continue to shape their learning in the future* (ACARA *A Curriculum…*). Australian general document does not include reading list, which is established separately in each state. However, it contains general approaches to the school study of literature, guided to work with texts based on research methods, adapted to the needs of contemporary school. They are: cultural studies, structuralism, comparativism and historicism. Authors of *The Australian Curriculum* present them as follows:

- *cultural studies, with emphasis on the different ways in which literature is significant in everyday life*
- *structuralism, with its emphasis on close analysis of literary works and the key ideas on which they are based; for example, the detailed stylistic study of differing styles of literary work*
- *comparativism, with its emphasis on comparisons of works of literature from different language, ethnic and cultural backgrounds*
- *historicism, with its emphasis on exploring the relationships between historical, cultural and literary traditions* (ACARA *The Australian Curriculum…*).

The first place putting for cultural studies suggest, that discussion of literary texts in Australian school is adapted to the needs of contemporary student, who sees the text in the intertexsutal contexts, especially created by the secondary broadcasters as film adaptations. Additionally, this theory refers to British cultural studies, that emphasise the semiotic power of audience. Thanks to this discussion about ancient texts is reading them in contemporary contexts. Furthermore, linking them with the everyday life of students makes texts close to them. This is especially important in the case of ancient texts

(in this case *Hamlet*), because it taught to discovery in the tradition relevant content for themselves.

Structuralism is used similarly, as in Polish schools. Concerns the analysis and interpretation functions of the individual components work to identify the key ideas of the text. It was emphasized that detailed study of functions of diverse styles serve to diagnosis of the main idea of the text. It was stressed that the detailed study of the diverse styles of texts serve to identify these ideas. On the basis Polish Philology considerations about the features of the components of literary works Bożena Chrząstowska developed, including his book *Theory of literature in school. From studies on the reception of poetry* (*Teoria literatury w szkole. Z badań nad recepcją liryki*), published in 1979.

Komparatywizm also operates in the Polish language teaching, although this term is commonly used. Interpreting literary texts in the contexts of the works and in the contexts, associated by the reader is addressing the literary work to present of the reader. As one of the first wrote about them Stanislaw Bortnowski in the book *Contexts of the literary work* issued in 1991.

Historicism as a poststructuralist position in theory of literature recommended methodological study of literary works on the background of the historical process. As its author in the form of *New historicism* is regarded Stephen Greenblatt. This research direction was established in the 80s Twentieth century. It examines the way of determining literary works by the author's gender, his race, religion, nationality, social origin and affiliation or even his political convictions. The text is therefore not autonomous, its shape is in fact conditioned by the cultural context of its creation. These remarks are important for the multicultural society of Australia. They help to understand the way of thinking of people with different cultural genealogies. In Poland, a country considered as monocultural, this position is not disseminated outside the academic publishing houses, for example, written by Anna Burzyńska and Michael Paul Markowski academic publication *Theories of twentieth century literature: a handbook*, issued in 2006.

The Australian Curriculum authors emphasize the need to link the study of literature with continuing the tradition, learning about other cultures and mechanisms that decide that the literary work is valuable: *The Literature strand also gives students the opportunity to study the processes by which certain literary works become 'prized' and 'perennial', the 'valuing' process itself, and why it is that most cultures have works they cherish. The approach to learning in this strand is not to present students with an English literary canon that is a static entity, but rather to invite their curiosity about, and develop an increasingly specialised inquiry into, the historical, cultural and*

aesthetic processes by which works come to be regarded as valued and cherished (ACARA *The Australian Curriculum…*). Thus oriented considerations direct students' attention to the masterpieces, but also are associated with their reception. Thanks to this *Hamlet's* cultural potential is used to shape the cultural identity of students.

2.2. SET OF TEACHING MATERIALS IN *BOARD OF STUDIES NSW*

So the portal *The Australian Curriculum. English* allows uniform ways of teaching the mother tongue in Australia, while the state portals, such as the *Board of Studies NSW*, will summarize all the teaching and examination materials. This allows teachers to explore in the classroom different perspectives of interpretation of text. Availability of previously prepared materials also relieve from the need to re-compile and publish them, which would involve costs of organization and material.

The thematic modules, including readings at different levels of education, at the Advanced occurs as a only compulsory *Shakespearian drama*. This term includes four plays by Shakespeare: *Hamlet, The Tempest, King Lear* and *Julius Caesar.* Most frequently it is discussed *Hamlet.* In 2000 informed, that: *13% of students are required to study one Shakespearian drama. In the New HSC, up to 40% of students will be required to study at least one of four dramas – Hamlet, The Tempest, King Lear and Julius Caesar* (BoS *Media Guide…*2000: 37). Therefore increased students' interest in Shakespearian drama (especially *Hamlet*), because contemporary Australians recognize them as texts, forming them collective identity.

In Australia webportal *Board of Studies NSW* is collected a set of teaching and examination materials since 1992. Examining them have led to the following conclusions:

2.2.1. *Hamlet* in mentioned in 45 of **documents following types**: *Prescriptions, Exam papers, Examination Reports, Annotaded Bibliography, Media Guide.*

2.2.2. Despite Australia's multicultural society in materials for teachers was noted **Christian values** inscribed in the tragedy:

- *The notions of the divine right of kingship, hierarchical structure of society, patriarchal dominance, Christian values.*
- *The play as a reflection of the Renaissance and the growth of ideas, intellectualism, the questioning of blind faith, rise of secularism.*

- *The play as a product of its religious context and the changing attitude to the Christian church. The growth in a more secular attitude to how man could directly communicate to God through silent prayer.*
- *The innovative use of the soliloquy not only as a dramatic device but also as a revelation of Hamlet's thinking and his personal dilemmas and paradoxes as representative of the Renaissance man caught between the worlds of Christianity and paganism and modern intellectual debate. In this way the play can be seen as a very modern play* (…).
- *The values of Shakespeare's audience: friendship, loyalty, the sanctity of marriage, fidelity, honour, revenge, omnipotence of God, a structured and ordered society, a strict hierarchy, patriarchy, filial duty, maternal and fraternal respect, love, sin, redemption, forgiveness, sanity* (State of New South Wales *2009 – 2012 HSC English Prescriptions* : 11-12).

2.2.3. Recommended for school use are new editions of *Hamlet*, edited by English universities publishing houses, which emphasizes the origin Australian culture, being derived from the British empire. Currently is recommended the 2003 edition (Cambridge University Press) and 2006 (Cambridge School Shakespeare). The first of these publications is prepared and updated by Philip Edwards. Includes text, information about its creation and content, the opinions of critics, summary, presentation of the most outstanding actors, and even information about current performances, latest videos and their critical interpretations, additionally offers readings. In Poland there was not published similarly updated book about *Pan Tadeusz*.

Hamlet is reading all included in *The Board of Studies NSW* prescriptions, starting in 1992. These materials include not only the tragedy itself, but also the context of theater, film. Movies are not recommended as a lecture, but as a intertextual dialogue: *Or perhaps you would like to compare Branagh's Hamlet to Olivier's; or Mel Gibson's (Zeffirelli's); or even Disney's The Lion King?* (Board of Studies *1992 Fiction, Film and other Texts…*). This way of presentation contexts for interpretation provokes a critical compilation, therefore suggests the organization of classes. In addition, the document language may dare teacher to direct dialogue with the film texts. Established in 1992, the document is current and available today. Demonstrates the need for teacher's domination of the information reported on the Internet, and emphasizes the need for his leadership in the learning process. This attitude has enabled Australians subordination of media coverage to literature teaching process, and the voices of secondary broadcasters remained secondary to the original author's expression. It also provides classroom work organization: a small number of readings allows

them to be detailed discussed and use of contexts needed. However a precise indication of curriculum (only topics sets and 25% readings are replaced every year for examination requirements) ensure effective preparation of students for HSC exam. Internet portals, however, are necessary in the work of an Australian student and teacher: *It is important for teachers to frequently revisit the English Stage 6 HSC Syllabus and refresh their own knowledge and understanding of the outcomes. Students should be aware of these elements of the course because the HSC assessment tasks and examination question will be imbedded in these outcomes and be the basis for the marking guidelines* (State of New South Wales *2009-2012 HSC English Prescriptons…* :4). Interpretation of the reading can therefore be precisely targeted at pre-specified problem, which reduces the stress before exam, encourage students and allows for detailed study, consider and discuss the given topics: *It is valuable for students to be aware of the type of questions traditionally asked in the HSC and that a bank of HSC style questions be established for students to use to test their own knowledge and understanding. These types of questions need to be introduced early in the teaching and learning programme and not only at the end. It is important that students are aware of the HSC requirements for this module* (State of New South Wales *2009-2012 HSC English Prescriptons…* :4). This way of teaching engaged pupils and reduces surprise students on the exam.

2.2.4. While learning **students are prepared to contemporary, personal understanding of the play**. In document *2009 – 2012 HSC English Prescriptions…* by State of New South Wales are shaped the following requirements to students:

1. ***Engage*** *with the prescribed text.*
2. *Develop an* ***informed personal understanding*** *of the text.*
3. ***Critically analyse and evaluate the language, content, construction*** *of the text*
4. *Develop an appreciation of the* ***textual integrity*** *of the text which is the unity of a text and how the elements of its form and language produce a coherent and integrated product (see Syllabus p143)*
5. *Refine* ***their own understanding*** *and interpretation of the text.*
6. *Critically consider their* ***own interpretations in the light of the perspectives of others.***
7. *Explore* ***how context influences their own and others' responses*** *to the text.*

8. *Consider how the text has been **received and valued (**State of NSW 2009-2012 English Prescriptions...: 3).*

It results in preparating students to engaging, personal and critical reading. According to the needs of multicultural country they also know how to take into account other viewpoints, reception conditions and the fact, that *"Hamlet" is a product of our context*.

2.2.5. Encyclopedism is excluded. Documents contain specifid guidance and wording and formulate specific guidelines, that can help the teacher to teach and students encourage to developing their own understanding of the play:

- *Why does Shakespeare continue to be included on the teaching lists for schools worldwide?*
- *Why in the NSW HSC is Shakespearian drama the compulsory text?*
- *How many productions of Shakespeare are currently being performed in NSW and/or Australia? See **Resource 1** for two reviews of 2008 Bell production.*
- *Why do filmmakers continue to re-make Shakespeare for cinema audiences? Extension 1 and GAT students should be able to contribute to the discussion with a more informed understanding of the concepts of the canon, high and low culture, what makes art, who determines what we should value and not value?*
- *What elements of Shakespeare make his plays relevant or irrelevant to an audience in 2009?*
- *Why are we studying this?*
- *What will continue to make Hamlet worthy of critical study? (State of New South Wales State of NSW 2009-2012 English Prescriptions...: 8-9).*

These questions provide direction the classroom discussion. They are also training before the exam - because in the Australian school, there are strong relationship between the content taught and the exam essay topics. Essays topics proposed for the HSC examination are based on thematic modules titles. Each student from the beginning knows what will be writing and getting ready for this task. This is why about passing the exam determines the quality of the submitted work, not luck or cheating.

2.2.6. *Hamlet* text is treated in Australia as valid. The analysis of documents shows that since 1995 *Hamlet* appears every year at the HSC examination.

The student develops in an essay problems included in this drama. Diversity topics demonstrates both the value of this tragedy, as well the ability of Australians to find in it the current references. During HSC Exams (Advanced) candidates wrote essays about: revenge, justice, language, perception of the world, values associated with each text, how the contexts of the texts have shaped their form and meaning, how text is developed and reshaped by another, comparative study , moral order, creating meaning, control that individuals have in society, signifiance of loyalty, struggle and disillusionment. Shakespearian drama allows for consideration of timeless issues.

The document *2009 – 2012 HSC English Prescriptions…* developed by the State of New Wales invoked themes of essays, which were proposed graduates in recent years. At a basic level themes for example were concerned about the role of contexts interpretation of *Hamlet: "Interpretations of texts can shift and change with time and place." Considering your time and place, reflect on the ways in which context has shaped your critical interpretation of* Hamlet. *In your response, refer to TWO extracts from your prescribed text* (HSC 2004). Exam essays examine the skills and understanding of a different opinion to persuade the listener, for example:*Your class has been exploring the question, "What will continue to make* Hamlet *worthy of critical study?" Your personal response has been challenged by another student. Defend your response through a critical evaluation of* Hamlet, *analysing the construction, content and language of the text* (HSC 2005). Topics are edited so as to provoke students to express their own opinions: *To what extent has your personal response to* Hamlet *been shaped by the enduring power of Shakespeare's characterisation of Hamlet? Support your evaluation with a close analysis of TWO key extracts from* Hamlet (HSC 2006).

The oldest discovered sheets of exam originates from 1995. *Hamlet* has been treated in it as a tragedy of revenge. Theme of revenge tragedy were compared with *The Duchess of Malfi* by John Webster (1612-1613). Thus reflections on Shakespeare's play was historical and theoretical, despite the fact that as a form of expression was used essay. But the examination paper of 1996 contains the following essay topic: „*Having to enter and act in the brutal world of his uncle, Hamlet himself becomes a creature of that world*". *Does he? What do you think?* This theme therefore tends to take a critical position towards the controversial opinions presented, because the longer form of expression in the HSC exam is the essay. In its assessment examiners require mainly a convincing discourse. It consists of text and contexts of understanding, analytical skills, planning, material selection and composition

of the whole essay. According to an document *Notes from the Marking Centre* w 2007 r. highest marks (17-20 p.) were awarded for an essay in which the examinee *Analyses skilfully how two significant elements of Emma/Hamlet/The Pardoner's Tale are reshaped to create meaning in Clueless/Rosencrantz and Guildenstern are Dead and A Simple Plan Evaluates skilfully the relationships between texts and contexts using well-selected and detailed textual reference.* (Board of Studies *2007* Notes…: 40).

2.2.7. Students learn to understand the **function of language** of drama. Ability to analyze and interpret linguistic forms is sometimes tested on the exam. In 1998, the essay topic was: *How does the language of the play convey Hamlet's perception of the world and of his place in it? Base your answer on the soliloquy printed here, but you should consider other speeches in the play as well* (BoS *1998 English 2/3 Unit Common Paper…).* It turned out that arose a very good essays, as the subject *allowed candidates to demonstrate their understanding of the play through discussion of the central character and the dramatist's use of language* (…). *The major difficulty for students was to synthesise the three major components of the question: Hamlet's perception of the world and his place in it; analysis/discussion of the set passage; and discussion of the language of the wider play. Better responses tended to address Shakespeare's use of language to present Hamlet's perception of the world and his place in it and weave the soliloquy and other language features into this discussion. These better responses demonstrated sophistication in their understanding of the play and Hamlet's character, as well as an obvious understanding of the interplay of language and idea. Their discussion of language was analytical and explicit though occasionally cleverly implicit. These responses demonstrated very good control of their own language and expression in presenting insightful comment on the text* (BoS *1998 HSC English 2/3 Unit Common Enhanced…*: 23).

2.2.8. The documents are **professionally prepared in terms of editorial and they operate specialized vocabulary.** There are used terms: *cultural studies, comparativism, historicism.* In a situation when *Annotated bibliography* is published it helps teachers to improve their qualifications. In a situation parallel publishing *Annotated bibliography* it helps teachers to improve their qualifications.

2.3. Hamlet and Pan Tadeusz in receipt documents

In 2010, candidate wrote an essay on the topic *"Shakespeare's «Hamlet» continues to engage audiences through its dramatic treatment of struggle and*

disillusionment". In the light of your critical study, does this statement resonate with your own interpretation of „Hamlet"? In your response, make detailed reference to the play (BoS .English (Advanced)… 2010: 5). In line with program assumptions drama was related to its contemporary reception and the candidate's own interpretation. Commentning on the proven work examiners said: *Better responses demonstrated a deep understanding of the relationship between dramatic form and notions of struggle and disillusionment, adopting a conceptual approach which reflected strong personal engagement with the text. These discerning responses did not merely rely on referencing critics or productions but demonstrated a critical appreciation of Hamlet which was based on insights gleaned from an evaluation of the perspectives of others in the light of a personal response to the play. Weaker responses tended to be descriptive and relied on recount to advance a narrow point of view. Textual references were often obvious, characterised by limited development and analysis. These responses did not demonstrate sufficient understanding of the play and showed little awareness of the impact of dramatic features in conveying ideas about struggle and disillusionment* (BoS Module B…: 2010). Examiners expect a reference to both the dramatic form, as to the problems of struggle and disillusionment, the use of sources in the form of statements of critics and film productions, as well as the emotional involvement of the writer. In the assessment of Hamlet was expected to take into account the speech of others characters. Sample student essays are published in the annually issued document *Notes from the Marking Centre.*

The reception of Shakespearian drama is also reflected in alumni statements on the Internet. They are extremely diverse. There are statements showing Shakespeare's text, combined with experience of the examinee: *with hamlet, although i knew that it was open ended, asking you for your interpretation, i felt that it was needed to mention loyalty, so i argued: *that disloyalty is shown not through human experience but through the corruption in Denmark (Claudius' disloyal actions) *death is another common theme in hamlet, and my interpretation is death is 'loyal' to its cause as it is the only force that seems to resolve the issue in the play, where any human fails to remain loyal to their cause* (hosay: 23 Oct 2009). There are also critical voices. Eddo003 writes 23 Oct 2009: *but module b- hamlet..... shiiit i had no idea!!! i just disagreed with it completely but found it hard to back up why.. ehh so hard for me, plus i was no where near finishing so i had to go the dot points!* (Eddo003: 23 Oct 2009). Negative attitudes of this author to the subject is probably due to his small capacity: he can not justify his critical opinion, in a public statements uses violent language, do not use capital letters. All this

demonstrates to his lack of respect for authority, schools, literary classics, and the exam.In Poland in 2009 at a basic level graduates wrote an elaboration on the subject: *On the basis of these passages of the poem by Adam Mickiewicz "Pan Tadeusz" characterize and compare the characters Sophie and Telimena*. Characterizing the statements of candidates stated: *The essence of the task that took graduate, was a comparison of the two heroines. Candidates should, therefore, to find those features and areas of women's lives that will give a comparison. It turned out to be difficult for writers or moderately difficult. (...) Both the number and type of errors made in the brief example of exercise equally indicate a lack of understanding of the fragments of the poem, which should read graduate, and low language skills at writing. Among the essays there are statements that contain cardinal factual errors, indicating that the candidate did not knew the literary text about which he wrote. For this type of errors were the most confusing characters, assigning features Sophie to Telimena and vice versa, writing about Telimena as a male (eg, "the prince Telimena in love with Sophie", "Telimena was so jealous of Sophie, that he poured her face a acid"). Graduate, in whose work appeared the cardinal factual errors, obtain 0 points for an essay*. (Król 2009: 24). It follows that knowledge of the national epic among graduates is insufficient.

On Internet forums school graduates variously mentioned contacts with the national epic. There are voices enthusiastic: *Mickiewicz was a genius, a master of improvisation. We must certainly have the right mood, and above the desire to read his work in order to appreciate what we had left. Luckily for me in high school I had a brilliant teacher of Polish, so I only have good memories associated with this book* (Adasko 2006). There are also critical voices: Is anyone still read today *Pan Tadeusz?Admit that the first two times as I read, I thought I go mad. Later I fell in love. There is so much fun, humor and eroticism. It is a pity that it is so badly in school discused ... (*bordman 2006). A personal relationship graduates to the national epic is also extremely diverse. Appear in statements referring to the deep meanings of the text, for example: *, just have you in his native village „Ladybug"* [supermarket], *and your neighbors all will leave to America and already feel what it is losing own place in the cosmos. Pan Tadeusz, says some of the world at twilight. All experience twilight the world, so Tadzik is current. Not that there homeland srutututu Napoleon, just simple nostalgia, sadness and transience makes Tadzik hit all the discos* (! Janurz 2006). More often, however, speak discouraged to the text: *I read Pan Tadeusz many times not being able to believe it impresses people, hoping that finally something in me moves and I can and I start ... but nothing* (elKonrado 2006). It follows that the

understanding of Mickiewicz's epic is diverse and it is mostly read in high school. The impact of school teaching is not always a Sufficient

CONCLUSION: TODAY FUNCTIONS OF *PAN TADEUSZ* AND *HAMLET*

Way to present the national epic in the portal *Scholaris* is didactically and methodologically outdated and unadequate to the core curriculum. The national epic for many young Poles are unattractive. Rarely functions as a tool for determining the collective identity, although it is mandatory reading. While Australians consistently use the cultural potential of *Hamlet* to build a multicultural state elite cohesion. It is suitable for this purpose because of the English common all Australian society, encoded in the consciousness of Shakespearian characters appeal to Christianity and relationship of the text with the problems of modernity. *Hamlet* was created 400 years ago and outside Australia, but it better inscribed in school in the contemporary Australian state interests than the nearly 200-year-old Pan Tadeusz in need of Poles.

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SOME PEDAGOGICAL ASPECTS IN ORGANIZATION OF MOBILE LEARNING IN TEACHING POLISH LANGUAGE

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Abstract*: In our research paper we try to determine, what pedagogical aspects are needed to organize an effective environment for using mobile devices in teaching Polish language? In May 2011 we had done the survey among 100 students from 39 countries at Warsaw University. The results showed that most students are still not ready to receive additional educational information by mobile networks. We develop recommendations for teachers how to find the best methods to use mobile technology in pedagogical practice.*

Keywords: mobile learning, student survey, mobile technology, pedagogical conditions.

1. INTRODUCTION

Mobile learning is used in various fields. Today we see that there is a wide variety of courses in a huge number of objects created specifically for mobile devices. One of the most popular courses in mobile learning is the language ones. It is obvious that to study a foreign language is a very difficult task, but it can perfectly help course designed for language learning on mobile devices (or/and mobile phones). It should be very convenient and practical for many students. Outlier in this regard is the competence of teachers to create and disseminate knowledge for students using different types of mobile devices. This is a fairly laborious process and it is important to find the pedagogical conditions necessary for the creation mobile learning content. Many teachers are interested in creating such mobile language courses for students.

There were some successful projects in Poland in implementation of mobile learning for studying foreign languages. For example since January 2006, Polish telecom customers have had the opportunity to learn English or

German via their mobile phones. The innovative language course – beyond the classroom, but featuring a personal trainer – is enjoying great popularity. This service is eagerly made use of, as surveys in Poland have proven: the majority of interviewees is not only interested in mobile learning, but also spontaneously took advantage of the opportunity to do so and enjoys using the service (http://www.knowledgepulse.org/downloads/ptc_microlearning_customerstory_en.pdf).

Some higher education institutions in Poland have already used elements of mobile learning in everyday educational practice. For example the Wyższa Szkoła Biznesu (National-Louis University) is looking at how modern advancements in information technology can be used to develop and support innovative teaching methods. Some of the new methods being examined include: interactive education games, virtual learning environments, mobile teaching systems, assessment and testing systems (http://www.wsb-nlu.edu.pl/en/news.html?articleId=3625).

These examples show interest in the development of mobile learning in Poland. However, in our study, we sought to identify the readiness of students to use mobile technology in learning Polish as a foreign language. And also help teachers find ways to use mobile technologies in teaching practice.

2. MOBILE LEARNING STUDENT SURVEY

2.1 Methodology

In the period from 10 to 23 of May 2011, we asked students in the Centre of Polish Language and Culture for Foreigners Polonicum at Warsaw University. There were tested 100 students from 12 different groups of Polish language proficiency (A, B, C). Questionnaires were anonymous. We have prepared a paper version of the questionnaire consisting of 14 questions. The questions are divided into three sections.

The first section had 5 common questions - age, educational institution, country, native language and used types of mobile devices.

The second section had 7 questions about a mobile phone of students - about the time and place where a mobile phone is used most often, mobile installed applications, types of wireless communication, SMS messages, about the problems associated with mobile phone use and the types of files that the student transferred from a mobile phone to PC. The third section had 2 questions - about the better forms for receiving mobile learning content and

the willingness of students to receive educational materials to mobile devices. The questionnaires were filled manually by students.

2.2 Results of survey

We interviewed 100 students, 59 percent are female and 41 percent male ones. In the next 3 age groups - 75 percent under 31 years, 16 percent under 21 percent and 9 percent elder 32 years. These results shows us that there were asked at least 3 different generations of students (Figure 1).

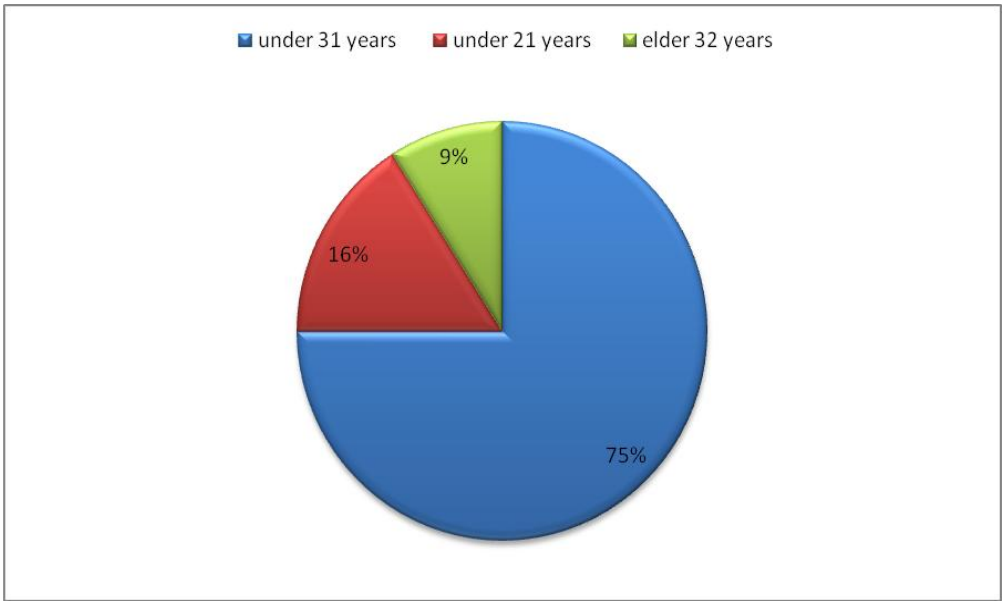

Figure 1. Ages of students who participated in survey.

Source: own

Also according to results of the questionnaire we had asked the students from 39 different countries (Figure 2).and these students study at 3 high schools in Warsaw. Students studied in 26 specialties and they defined as a native 33 languages (Figure 3).

These data allow us to state that our survey has international character as we have asked students from different countries, who study Polish language. It seems to us to bring added value data collected, as it can help to define the universal conditions for the use of mobile technology in learning foreign languages.

Table 1.

Countries of foreign students.

Country	%
Germany	13
Bulgaria	11
Russia	11
Belarus	6
Spain	5
Ukraine	5
Hungary	4
Japan	4
USA	3
Other	38

Source: own

Table 2.

Native languages of foreign students.

Language	%
Russian	16
German	12
Bulgarian	11
English	8
Belarusian	5
Spanish	4
Other	44

Source: own

We asked student about what mobile devices they use every day. The survey results indicate that students identified 9 types of devices. According to the research, 97 percent of students use a mobile phone or smart phone, 71 percent use notebook or netbook, 42 percent use a media player, 26 percent use a digital camera, 8 percent use a Pocket PC, 7 percent use a Tablet PC, 4 percent use a GPS navigator, 3 percent use an e-reader and only 1 percent use a game console. It should be noted that the most frequently used device is a mobile phone (Figure 4).

100 percent of the respondents reported that they have a mobile phone or smartphone. It is important to note that all asked students indicate a mobile phone as necessary device and use it daily. We predicted this result on the stage of preparing our questionnaire. Therefore, we have focused on a mobile phone as the primary device for use in education practice. Mobile learning student's survey indicates that the periods of time when students use a mobile phone is not so different. The majority of respondents (67 percent) said that they use mobile phone in any free time, 20 percent are defining a dinner time and 18 percent said that they use mobile phones during study hours and only 13 percent use before going to bed. 11 percent of respondents said that they use a mobile phone during working hours (Figure 5).

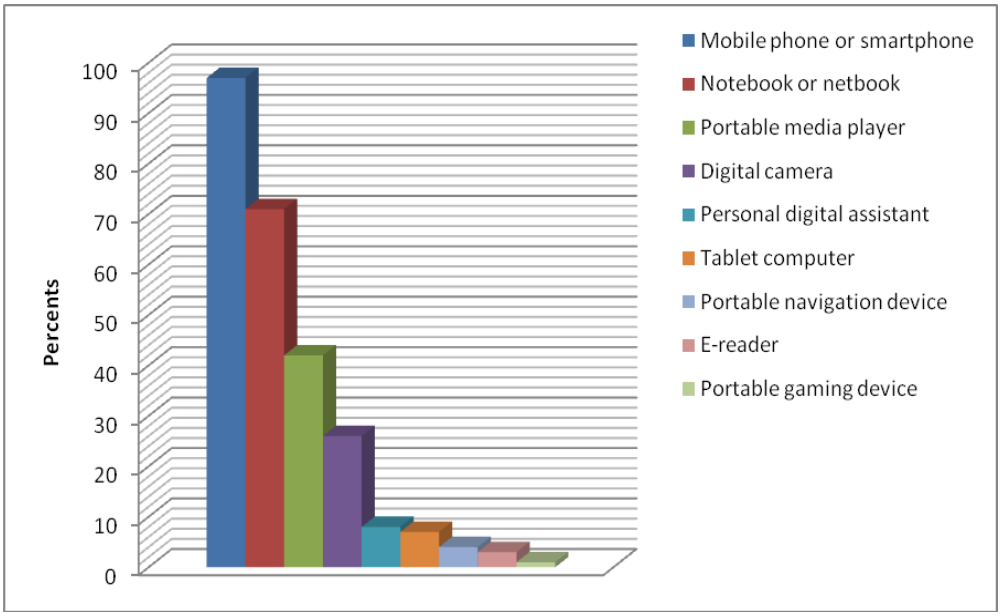

Figure 4. Types of mobile devices using by students.

Source: own

It is also equally important for us indicate the places where students use their mobile phones. Obviously that during a day student is present in many different places and for us it was important to determine where student use a mobile phone for possible learning activity. More than 60 percent of students said that use it at home, 55 percent use mobile phone in public transport, and 28 percent use it at a bus stop, at a station and airport. 21 percent of students

use mobile phone in public eating places and both 10 percent use it standing in a queue or in the university.

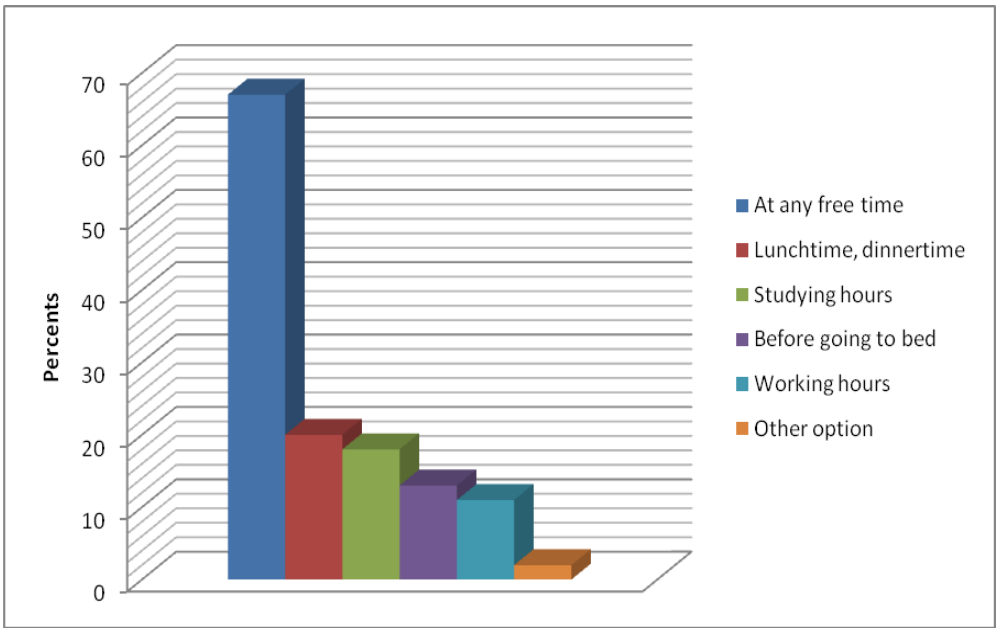

Figure 5. Time of using a mobile phone.

Source: own

Also we were received responses such as "in a car" (4 percents) and other opinions as "everywhere" and "in a park". From these responses it is evident that the students use mobile phones more often in outdoors, perhaps due to the fact that the mobile phone is seen only as a communication tool, but not as a learning one (Figure 6).

More and more advanced mobile phones and in particular smartphones have additional applications that enhance their core capabilities. In our research we tried to identify the additional applications (programs) that students use or install on their mobile phones. According to the results 73 percent of students did not use any applications, 23 percent said that they use social networking apps, 11 percent use video conference program (such as Skype) and 10 percent answered that use instant messenger (such as ICQ, Yahoo! Messenger).

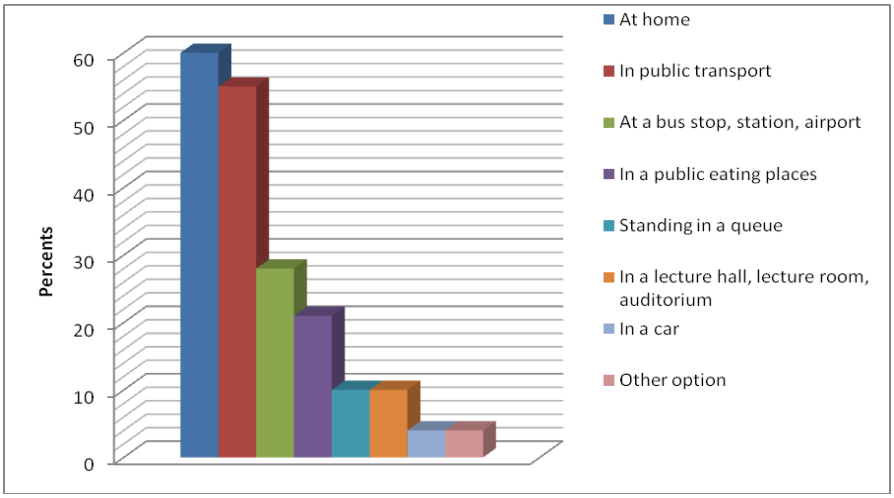

Figure 6. Places where students use a mobile phone.

Source: own

The result of students' other options showed (4 percent) some useful applications as "electronic dictionaries" and "reading program" that can be used in study Polish language. For example, student can use dictionary from Polish to other language and read the Polish books on his mobile phone if it were installed necessary applications. Only 3 percent of students use applications that allow using micro blogging system (as Twitter) on mobile phone. It should be noticed average level of interest in using popular social services by mobile phones (Figure 7).

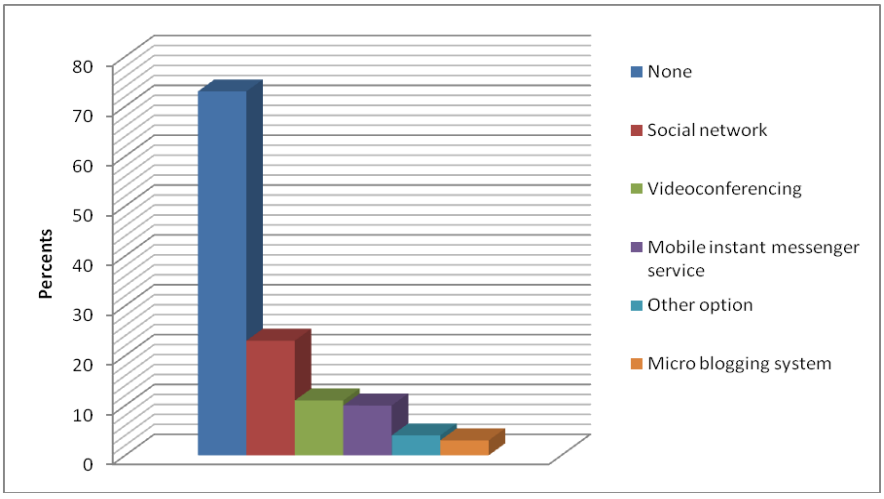

Figure 7. Mobile phone applications using by students.

Source: own

The question about using wireless networks on mobile phones was very important. The results shows that 45 percent of students use Bluetooth, 42 percent do not use any wireless networks, 25 percent use WIFI and only 5 percent use IR port for data transmission. We received also 1 answer "UMTS" (Universal Mobile Telecommunications System). Perhaps students prefer use Bluetooth and WIFI connections, because mostly types of mobile phones have these wireless modules (Figure 8).

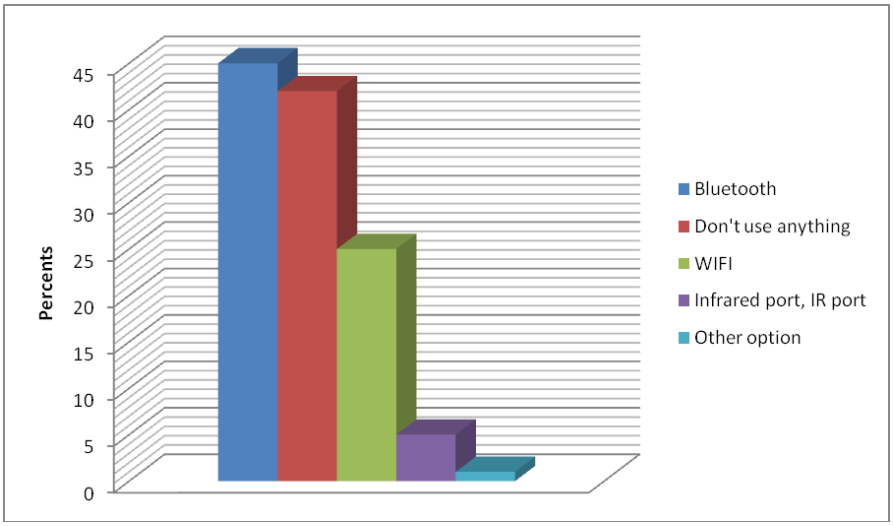

Figure 8. Types of wireless connections using on students' mobile phones.
Source: own

One of the most accessible and popular mobile service is SMS (Short Massage System). In our survey we consider SMS as a primary method for delivering educational content. During the survey was founded that 65 percent of respondents send or receive from 1 to 5 SMS messages per day. 16 percent send less than 10 messages and 15 percent receive more than 10 messages per day. And only 4 percent of students did not receive any messages. Thus, SMS service in most cases it is actively used by students (Figure 9).

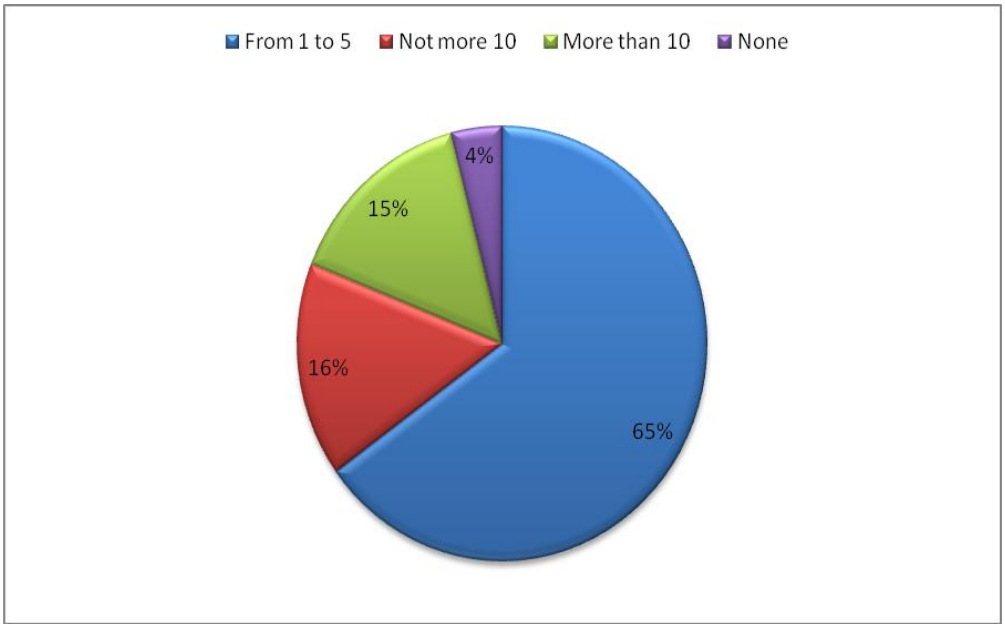

Figure 9. Quantity of students' SMS messages.

Source: own

We attempted to determine students' opinions about the mobile phone as a tool of learning. Obviously that mobile phone is a device with different parameters and capabilities but also with many disadvantages. We asked students define main problems in using a mobile phone.

More than half of students (52 percent) responded that they have not any problems in using a mobile phone. 31 percent of students answered that it is a low battery charge, 15 percent noted a small screen size, and 11 percent of students indicated a slow Internet connection. 8 percent of students answered that it is hard typing, 4 percent noted other observations such as "no internet connection", "small capacity for files" and "simply too old to run social apps properly". And only 1 student pointed out the difficulty in using a mobile phone (Figure 10).

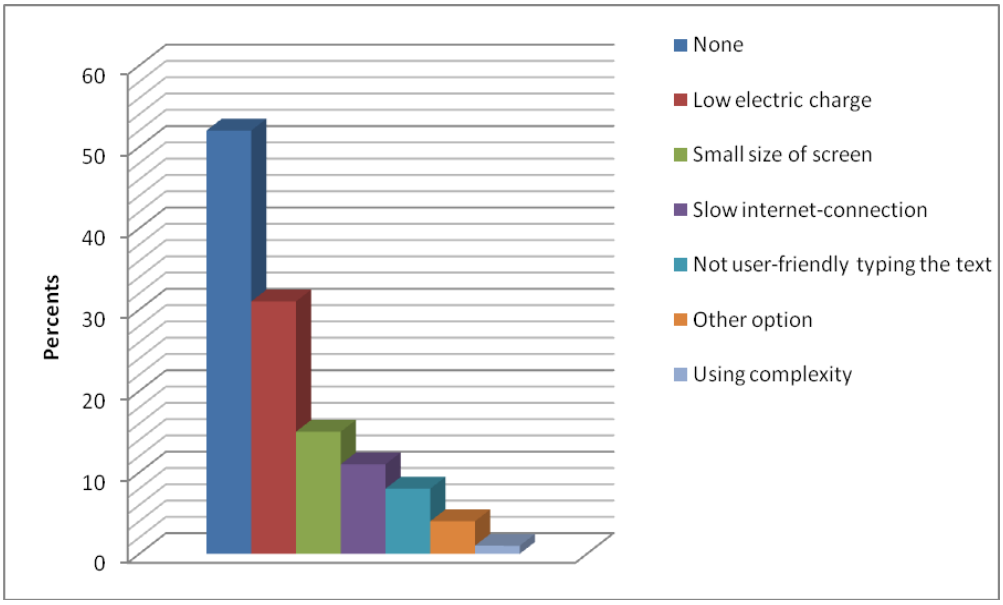

Figure 10. Main problems in using a mobile phone.

Source: own

In our survey, we tried to identify appropriate forms for delivering mobile learning content. It was important to know the opinions of students about types of digital files and formats and then we possibly could be find convenient forms for sending and receiving educational materials for mobile phones.

We asked students about types of files that they had ever transferred from mobile phones to other one or a Personal Computer. 58 percent students answered that there was a photo file, 43 percent defined an audio file. 36 percent had never transferred any files from their mobile phone. 20 percent of students said that it was a video file and 14 percent of students pointed on a text document. 9 percent of students transferred an application and only 2 percent showed a game program.

From the responses we see that in most cases, students transfer photos and audio files (Figure 11).

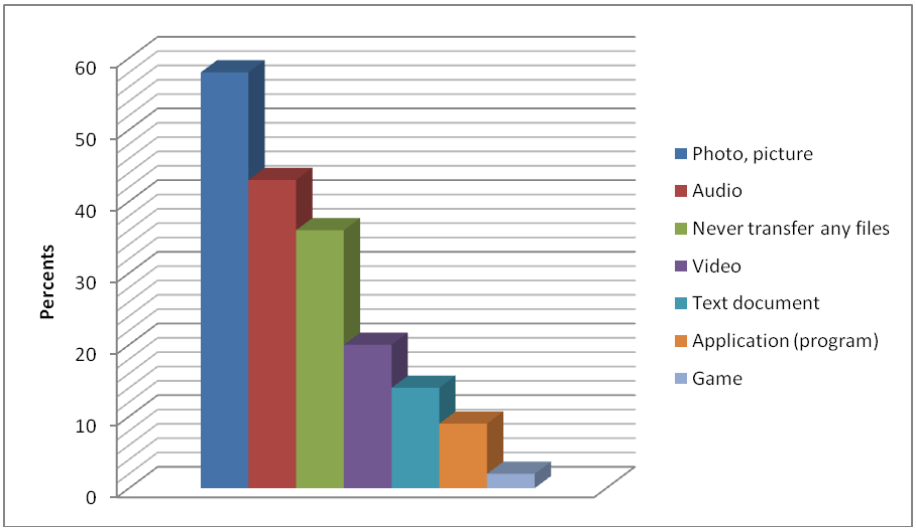

Figure 11. Different types of files appropriate for mobile learning content.

Source: own

At the end of the questionnaire we asked students about the desire to receive educational materials on their mobile phones. 63 percent of students responded negatively and only 37 percent responded positively (Figure 12).

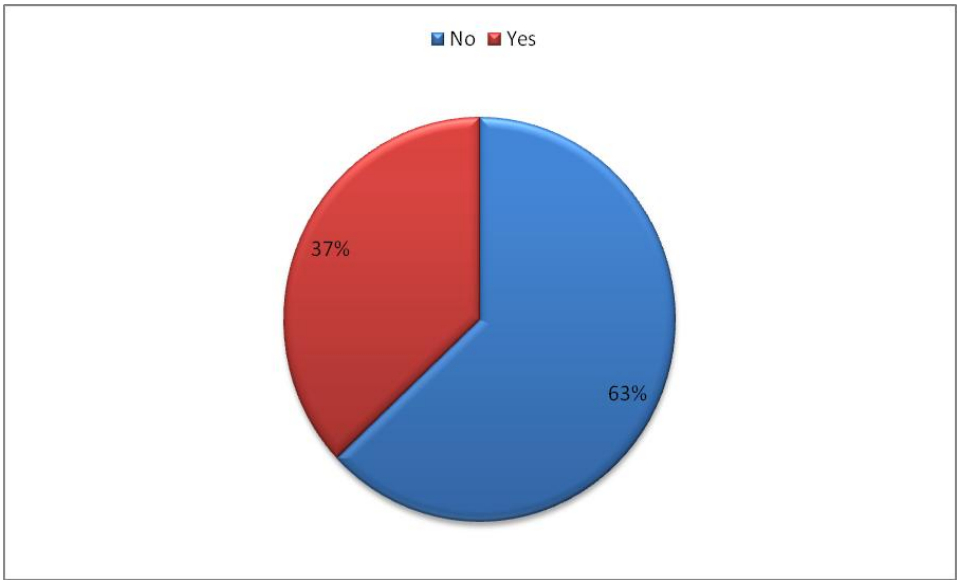

Figure 12. Opinions of students about receiving mobile learning content.

Source: own

2.3 Summary of responses

Summarizing the results of the survey, we can draw the following conclusions:

- 84 percent of students were born before 1990 year. And only 16 percent of students were born between the early 1990s and the early 2000s. They are Generation Z (also known as Generation M, the Net Generation, or the Internet Generation) this generation have had lifelong use of communications and media technologies such as the World Wide Web, text messaging, MP3 players, mobile phones, earning them the nickname "digital natives".
- All students use 9 types of mobile devices; mainly there are mobile phones, laptops and portable media players.
- Students use mobile phones mostly at home and in public transport and at a bus stop, station and airport.
- Students generally do not install/download any mobile applications (except social network ones), and they mostly use Bluetooth as a wireless connection.
- In most cases, a student sends and receives between 1 and 5 SMS messages per day.
- The main problem of using mobile phones as a teaching tool is a low electric charge and a small screen size.
- We can also provide some pedagogical aspects**:**
- The best forms for delivery educational information to student's mobile phone are a photo or a picture, and an audio file.
- Students in common case do not want to receive an additional learning content (studying information) on a mobile phone.

3. PRACTICE MOBILE LEARNING METHODS

In our research we have developed 2 methods that can be used by teachers of Polish language. These methods are designed to work with students who are learning Polish language.

3.1. Method "Polish language in a mobile phone”

This method uses SMS (Short Message Service) technology, which allows for sending and receiving short text messages by mobile phone.

There are 2 types of SMS messages:

"SMS-WORD" (SLOWO POLSKA)

The message contains a dictionary entry. This entry reflects modern word (urban youth language or slang) content. Such messages may be useful for the study entries that student do not meet the academic dictionaries.

"SMS-PHRASE" (FRAZA POLSKA)

The message contains frequently used phrase to explain the values of modern, urban youth language. This is can be a proverb, conversational phrase from a famous Polish book or from popular movie.

Stages of method implementation:

Stage 1 - the students reported about the project (in oral form, announcement or poster)

Stage 2 – if student wants to get SMS he completes a special form (name, group, the number of mobile phone and service provider).

Stage 3 - Each teacher creates a group of contacts and sends SMS to students from his mobile phone or uses the free Internet services operators. We think that better to prepare and send «SMS-WORD" with a periodicity of 1 time per day and «SMS-PHRASE" once a week.

3.2 Method «Flash cards»

The aim of this method is creation of teaching cards with text and image for study the Polish words. The ways of project implementation - there are cards in the format JPEG (images and words with transcriptions).This method is quite a long time used for learning foreign words.

We offer simple way to create such teaching cards.

First of all we should to explain some definitions. JPEG (Joint Photographic Experts Group) - one of the popular image formats used to store photographs and similar images. JPEG is the most popular extension on all platforms.

It is important to note that the cards should be created in a suitable mobile phone screen size. It can be follow sizes - 240 by 320 pixels and 320 by 480 pixels

We offer the following algorithm for creating learning cards:

1) The teacher creates a text electronic document. The text file contains a list of words, written in Polish and English.

2) The teacher with the help of search engines (Google, Bing etc.) find the necessary images (photographs, painted images) and download images on his computer.

The teacher can use program Picture Manager for creation language flash cards. This is a software program included with Microsoft Office suite starting with version 2003. Microsoft Office Picture Manager has the ability to crop, resize, and convert images between various formats like Paint, but with comparably better picture quality, due to being able to select compression level.

Next step is making appropriate size of the images resolution of 240 by 320 pixels and 320 by 480 pixels.

3) With the image editor Paint (formerly Paintbrush for Windows) is a simple graphics painting program that has been included with all versions of Microsoft Windows, the teacher can make an inscription on the picture. The program comes with the following options in its Tool Box. A text box's purpose is to allow the user to input text information to be used by the program.

4) Every file gets a unique name and can be spread via email or via wireless communication protocols to mobile devices of students.

We hope that descriptions of these methods will help teachers in their practice. These methods can be modified if it will need by teachers for better using.

CONCLUSION

Use of mobile learning components in teaching practice can be an effective way to develop digital competence in our information society. Learning with mobile devices is becoming increasingly important factor in the educational sector in the near future. It is very important at this stage to create effective conditions for organization of mobile learning in different institutions of education. In our research we have found that students have quite high level of digital competence in using of mobile technology. But at the same time it is need to use these skills and for educational and learning purposes. Students are able to independently and freely navigate in current trends and directions of mobile services and technologies.

The task of a teacher at the same time is in ability to use mobile devices and communications equipment and to desire that knowledge using in educational sphere. As we have shown in the data of our survey - modern teachers can

use so many possibilities and conditions for organization of mobile learning in their teaching practice. Of course in our study, we showed the results of among a small number of students. And these results are not accurately reflected the state of the mobile digital competence of modern students.

We understand that this process requires a broader and longer-term research work. Nevertheless we mainly have focused on the possible use of mobile devices in teaching Polish language. And it allows developing methods for the use of mobile technology in education without practical results. These methods are only our predictions. At the same time this are our attempt to develop mobile learning methods as simple as possible available for teachers.

We have identified that students, regardless of country, age and various specialties have same level basic mobile communication skills and actively use mobile devices in everyday life. But now we face a new problems and challenges. How teachers can effectively adapt in rapidly changing pace of progress and properly use all technological potential of a mobile age?

This issue requires further study and in our future researchers we will have to analyze data about how our methods will applied in pedagogical practice. We can predict that the development of mobile learning in the near future will grow and grow continuously. But at the current stage we will try to describe all the basic conditions for successful implementation of mobile learning in different educational institutions.

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“E-TRAINING MANAGER” PROJECT AS AN EXAMPLE OF DEVELOPING COMPETENCE USING ON-LINE EDUCATION FOR TRAINING THE PUBLIC ORDER SERVICES

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Abstract: *Considering the experience of different individual public order services and, the need of development of knowledge and abilities using electronic educational solutions as a distance learning mechanism in the process of educating a project was created entitled "E-training Manager of Uniformed Services in the Mazovian Voivodeship". The following study is an attempt to describe the example of good practice of an educational project directed at employees of public order services, employed in training centres or organisational units responsible for training processes.*

Keywords: e-learning, blended learning.

INTRODUCTION

The staff training of uniformed services includes both basic training (preparation for performing a particular profession), speciality skills training (preparation for performing tasks within the framework of a professional profile) as well as professional development (for people performing tasks). There is also training on a higher level that prepares the candidate for a bachelor's degree. Training processes are being carried out by various institutions, beginning at the workplace, then training centres or schools for different uniform services, outside institutions and finally at Universities. It is worth noting that the above mentioned processes concern only adults.

Various individuals carry out training activities: employees of given public order institution or outside instructors. Some of these individuals have a pedagogic background (K. Wuszt 2008). The dominant style of work is the traditional method of training based on direct communication. However,

just as other training institutions – public order services training structures also started applying on-line training as part of their practice within the last few years. A number of them began using e-learning platforms. As part of the task in preparing the project, a number of people responsible for training were interviewed and a number of issues were raised:

- among employees responsible for conducting training courses there are not many people who can prepare and conduct training on-line,
- there is a deficit of competence in respect to methodology of on-line training.

The problems associated with introducing distance learning in the Police Forces (Surmacz 2009) as well as examining the technology development model in education can be grouped into four stages:

1. Emerging Stage, emerges out of technology – discovering and becoming aware of the possibilities of technology (equipment and software) and its educational applications,
2. Applying Stage – applying technology in assisting teaching subjects based on the principle of 'adding' technology to current existing practices,
3. Integrating stage – integrating technology with educational fields, solving actual problems,
4. Transformation stage – technology influences the change of education and function of school as an educational institution existing in the local environment (Sysło 2009).

The application of training on-line (e-training) in the training system of the uniformed services is in the emerging stage.

The barriers in implementing or using on-line training are known and described in literature (Hyla 2007). Human, technical, and corporate barriers are listed. The quality of training materials is an important determinant in the effectiveness of on-line training.

Due to the above situation an idea was developed to equip a considerable group of people with adequate knowledge and abilities so as to effectively use on-line training as part of their educational work in their institutions.

1. ABOUT THE PROJECT

The project "*E-training Manager of Uniformed Services in the Mazovian Voivodeship*", referred to as "E-training Manager" is an educational project directed at employees of public order services, employed in training centres or organisational cells responsible for training in the Mazovian Voivodeship. 120 people are to be the beneficiaries of this project. Tomorrow Sp. z o.o., from Warsaw, is the leader of the project, in partnership with the Economic University in Kraków. The project was funded partially from the European Social Fund as part of the Human Capital Operating Program. The project is scheduled to rum from 01.01.2011 to 30.10.2011.

1.1 Project's aims

The main purpose of the project is to equip (in a planned time schedule) min. 80% of the beneficiaries / participants of the project with skills enabling effective implementation of training programmes using on-line formula. In order to accomplish this a programme was prepared which encompasses traditional and on-line training.

The detailed aims of the project are as follows:

1. Equip beneficiaries with methodological skills, with emphasis on using on-line training formula in the educational process.
2. Build practical abilities in beneficiaries associated with using on-line training.
3. Develop competence in creating on-line training.

In order to realise the above aims the following tasks were planned:

- project managing, which includes monitoring, evaluation, promotion, recruitment,
- preparing on-line training,
- completion of in-class training,
- completion of on-line training.

1.2 Project's concept

The project assumes that all participants will take part in a general block of lessons (consisting of 7 modules), and among all the participants 30 are to be selected and are to take part in additional block of lessons called specialist module. The general block covers 64 teaching hours conducted in traditional classrooms and 47 teaching hours conducted on-line. Whereas, the specialist block consists of 16 teaching hours in the classroom and 10 teaching hours

on-line. In-class lessons were conducted in four different locations. The training participants were divided into groups of ten. The schedule of in-class lessons consisted of four two-day sessions (Saturday, Sunday), conducted on average every five weeks. It was decided that in-class lessons at each of the locations would take place at a different date, in order to facilitate the participation in the classes.

The participants of the training program must develop training materials dedicated to on-line training.

The final results will be evaluated based on self-assessment questionnaires, progress analysis, training observation. Upon obtaining positive results the participants will be issued with appropriate certificates.

1.3 Technical scope of the project

The topics to be covered in each block of lessons were developed based on the commonly accepted aims of the project. They take into account the specific training processes of institutions the participants come from. The theoretical basis of the training is based on the methods and principles of adult education.

The general block of lessons consists of the following modules:

1. Interpersonal communication,
2. Proper use of teaching materials in the process of education,
3. Motivation and evaluation of adult students,
4. Active methods of teaching adults,
5. Methodology of distance learning,
6. Methods of conducting complementary training,
7. Team management.

The specialist block includes training content associated with the preparation of teaching materials to be applied in complementary teaching.

1.4 Project's target group

As mentioned earlier, the project is directed to employees of public order services responsible for training in their institutions which are located in the Mazovian Voivodeship. In the Mazovian Voivodeship there are registered offices of organisational units arranging or carrying out training programmes for employees from the entire country.

People who meet the above mentioned conditions and who voluntarily wanted to develop their knowledge and skills in an on-line training program could apply to take part in the project. Furthermore, the participation in the project was outside their regular hours of work and thus not counted as part of their work.

Below is a list of conditions that were established in the recruitment process for the project:

- must be employed in the public order services in the Mazovian Voivodeship
- must be employed in a centre or unit responsible for training,
- must have completed secondary education (high school),
- must express the desire for self-development outside working hours,
- must be interested in improving their competencies,
- must be interested in obtaining knowledge in the area of training methodology to manage and conduct e-learning training.

As planned, 120 candidates were accepted to take part in the project. The recruitment consisted of distributing information in the form of folders, posters, and on web sites of applicable institutions. The fulfilment of the recruitment plan was not a considerable problem. The above mentioned analysis and adequately evaluated needs constituted the proper basis for conducting recruitment[1].

2. REMARKS CONCERNING CERTAIN ASPECTS OF THE PROJECT

The training schedule was prepared in harmony with the requirements of blended learning. Blended learning is an effective form of education that combines the traditional means of education with electronic means (Plebańska 2011). This mainly pertains to institutions responsible for adult education. The project established that by appropriately combining the advantages of complementary training methods would result in accomplishing the accepted aims of the project. If we consider the criteria the processes of blended learning have a very diverse classification: forms of

[1] The project's information was based on the application to gain funding for "E-manager" project as part of Human Capital Operating Program.

teaching, educational tools, modes of teaching, and forms of participation (M. Plebańska 2011). Naturally the training process proceeded as planned:

Traditional training → e-learning training → evaluation

The selection of individual modules in the general block was connected with the fact that the people conducting classes for adults (e.g. teacher, instructor) should have suitable pedagogic competence that takes into account principles of andragogy. Moreover, if they apply on-line training at work then this results in the need of obtaining further competencies. Apart from knowledge and abilities associated with information technology they should also posses abilities in the areas of motivation, building self-confidence, helping and evaluating (Clarke 2007).

The contents of the specialist block were associated with the problem observed whilst preparing the project, and that is the ability to independently prepare on-line training without suitable competence. It is an attempt to support those who will independently or in a team prepare electronic training. It is a problem for many institutions which are implementing or using e-learning to quickly and at low cost create on-line training programmes (Dziubińska, Wierzbicka 2011). As written by R. Lorens, to develop an on-line training program one needs a professional expert, a computer graphic designer, and a media instructor. The appointment and functioning of such a team in a school environment is rather impossible, and the tasks of such a team are assumed by the teacher (Lorens 2011).

It seems that tools associated with on-line training will be particularly useful to public order service institutions in the area of providing information pertaining to procedures. Relatively low cost aspects of on-line training as well as easy access to Intranet justify the need for implementing electronic training tools for these institutions. Another use of implementing e-learning tools can be in supporting employee meetings (Woźniak 2009). E-learning platform mechanisms contain portions of information / didactic materials with which employees can become acquainted in a controlled manner.

CONCLUSION

By observing the recruitment and the training process of the above-mentioned project it can be concluded that the set goals have been met. As underlined in the literature on the subject (e.g. Hyla 2007), motivation was an important factor for the participants of this project. The participants expressed the opinion that some modules were too short and lacking in

content, especially concerning the issues related to team management. This is valuable information for the project's authors because it exhibits additional areas of activity in the future. The process of creating training lessons - particularly on-line - requires the participation of many people. Their selection, skills and co-operation favour the proper development of on-line training.

In conclusion the author of this study wants to point out that he consciously omitted the issues associated with the e-learning platform applied in the above-mentioned project and with the information technology used. Instead the author wanted to present the issues of developing proper skills in people responsible for training processes at their institutions.

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E-LEARNING IN PRACTICE

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Abstract: *This paper is focused on a comparison of our experience with electronic learning (e-learning) as a support of education in practice. These days the word "e-learning" is pronounced very often, and it seems that e-learning or the learning management systems are very modern and progressive method, how to increase or optimize quality of teaching at all schools or in companies over the world. The main idea of this paper is to describe e-learning environment from the perspective based on our experience from studying at several Czech and foreign technical universities. We can also use multiyear working experience in the hi-tech and modern companies. This experience can make the relevant information base for a subjective evaluation of the suitability and efficiency of every single type of education with an emphasis on electronic learning as a part of blended learning implemented in practice.*

Keywords: Blended learning, distance learning, electronic learning, e-learning, education.

INTRODUCTION

E-learning has been become a very popular form of education at universities around the world. It is very suitable for areas where is a rapid progression and where is needed to change studying materials very often (El-Bakry, Mastorakis 2008). We live at the beginning of the 21st century which can be characterized by dynamic development of the communication technology and we can call this period as "the age of the Internet". Commercial significance of the Internet is approximately from 1993. The number of

Internet users has exponentially increased - it represents huge communication strength.

We can prosper from this progression by adapting modern methodology into education form. It will be much more attractive and with lots of advantages. Some learning modules can be prepared as e-learning courses for their flexibility. The other point of view is an access to the students. Students want to study by using modern methods of education (Mazalkova, Mazurek, Kuneta 2011).

Information and communication technologies offer new opportunities for their wide using in education. Especially in distance learning these technologies can be used as a multimedia learning support, communication between learners and teachers, in the organization and administration of distance learning, etc.

A separate chapter is the usage of new learning technologies via the Internet (online electronic learning). New virtual universities have been established and they are becoming a worldwide phenomenon. Preparing of high quality educational programs or courses on the Internet is extremely demanding process from the didactic and pedagogical/psychological point of view.

The rapid development of the video-conferencing technology has been seen in several years ago. This technology we can reduce spatial and time demands but it still force the participants to concentrate themselves in a certain time and in a place, where the video-conference is transmitted. The high technological and financial demands are strong inhibiting factor for wider usage of this technology nowadays.

1. DEVELOPMENT OF THE INTERNET PERCEPTION

In the past e-learning was only limited to voluntary education and distance education at universities or to obtain basic skills like using software MS Word (see Figure 1). Nowadays the situation is completely different. E-learning in companies is usually specially designed application, whose main goal is a fast delivery of certain information usable in practice. (Mazalkova, Mazurek, Kuneta 2011).

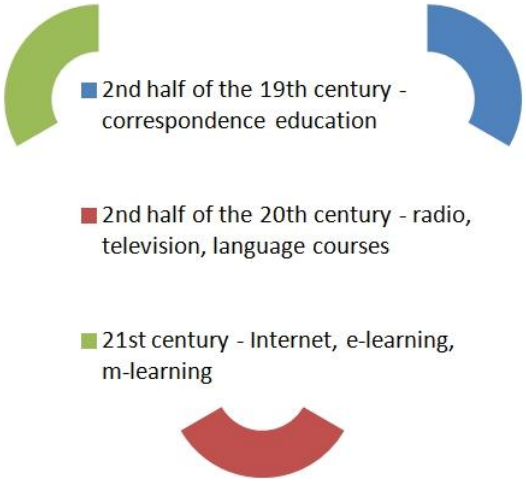

Figure 1. Trend of the various forms of distance learning.

Source: Own (prepared by author)

E-learning is primarily connected with personal computers. Due to the development of new categories of communication devices such as handhelds or personal computers or organizers and also a new generation of mobile phones or tablets which allow us to connect to the Internet the most modern approach to electronic learning is co-called mobile learning (m-learning), which is using these new technologies allowing the greatest mobility and flexibility. Present mobile devices have enough power and abilities for displaying videos and there is no reason why they could not serve as an education tool as well as for an access to information on the Internet.

Distance learning do not exclude on-site electronic learning, however it cannot fully replace traditional way of learning. E-learning is a very efficient usage of information technologies in education. It is a modern method of education, but it does not mean only transformation of traditional books into electronic form. The Internet makes the education cheaper and faster.

Base on our personal research and according to our opinion we summarized the influence of the Internet in the most significant areas (shown on Figure 2). From the graph on Figure 2 flows clear proof that the Internet is becoming very significant tool for our education, because it offers information and it also enables easy communication.

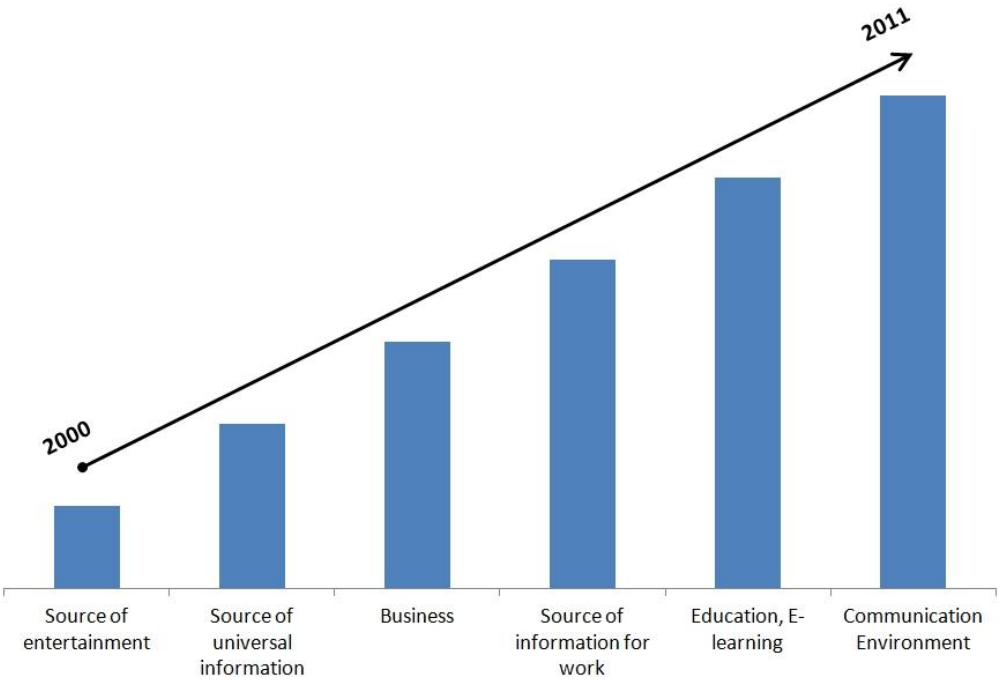

Figure 2. Development of the Internet perception.

Source: Own (prepared by author)

Table 1. Different forms of learning on different levels of education.

Level of education	On-site learning	Distance learning	Online e-learning
Nursery school	X		
Elementary school	X		X
Middle school	X		X
High school	X	X	X
University	X	X	X
Doctorate degree	X	X	X
In practice		X	X
Research		X	X

Source: (Mazalkova, Mazurek, Kuneta 2011)

Table 1 shows the fact that distance learning and online electronic learning are especially suitable for the higher levels of education and also in practice and in research.

2. EDUCATION OF DIFFERENT SKILLS BY BLENDED LEARNING IN PRACTICE

E-learning has indisputable contribution to the on-site or distance learning, but we must not overestimate it. In our opinion the optimal form of education is blended learning with utilization of materials in electronic form (traditional learning + online e-learning).

Electronic learning is focused on knowledge (often encyclopedic) and it mostly cannot develop some skills showed on Figure 3 - especially teamwork, where being advised is always faster than the fastest Internet.

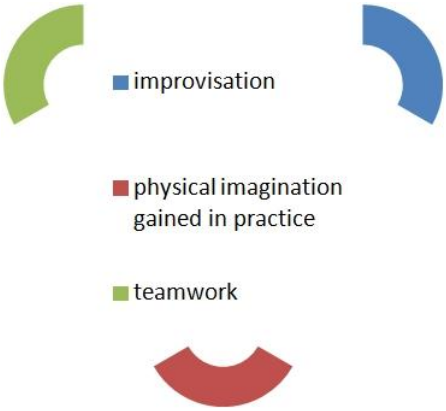

Figure 3. Some skills which cannot be developed by e-learning.

Source: Own (prepared by author)

Education requirements in practice are continuously increasing. The company, which wants to be competitive, has to continually educate its employees, it has to analyze what employees know and what they should know => this company should create its own schedule of education.

The graph on the Figure 4 shows the differentiation of skills. In all of these types of skills (and during their education) is very suitable to use blended learning.

Figure 4. Types of skills.

Source: Own (prepared by author)

An example of a successful and reliable application of blended learning in practice is Cisco Networking Academy (CNA) created by the Cisco Systems (Kaderka 2009). This program is engaged both in theoretical and practical education on several IT areas and it becomes very popular among employees and at universities. This program has 3 main fundamental pillars as is shown on Figure 5). The results of this worldwide blended learning program are very well trained networking specialists.

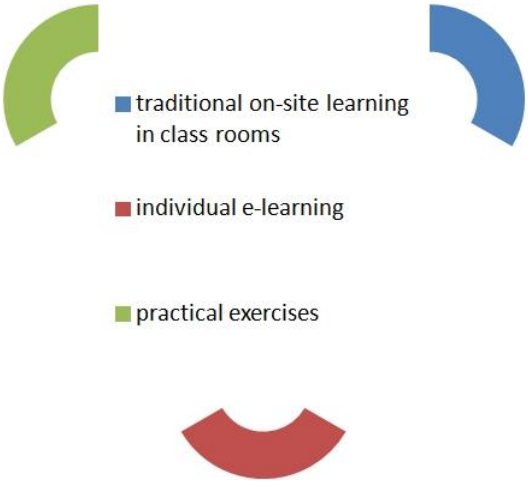

Figure 5. Fundamental pillars of CNA.

Source: Own (prepared by author)

The other example of progressive using of blended learning in practice is the implementation of m-learning English courses in the company Mesit pristroje spol. s r.o. The employees have regular on-site classes, but the teacher is also available on the phone 24 hours a day, 7 days a week and every employee can call the teacher when he/she wants to converse in English or consult homework - for example during the driving (Mazalkova, Mazurek, Kuneta 2011).

3. OUR EXPERIENCE WITH E-LEARNING AT UNIVERSITIES

The idea of this paragraph is to describe e-learning environment at several Czech and foreign technical universities where we have had an opportunity to study. Learning Management System (LMS) based on Moodle (Modular Object-Oriented Dynamic Learning Environment) was implemented at all these universities (Official web page of Moodle project 2011).

At the University of Defence, where we are currently as doctoral students, e-learning is mainly used for improving language skills at the Language Training Centre and also at the Department of Mathematics and Physics.

Based on our personal experience with e-learning at foreign universities (ENSIETA France and Helsinki University of Technology Finland, where we were as ERASMUS students) we can make a brief comparison between e-learning utilization at universities abroad and universities in the Czech Republic. Czech Technical University, where we got our bachelor and master degree, uses the modern methods of education more than in ENSIETA, where is mandatory attendance and classical type of education (class-lessons, practicing and using school library as a source of information), so they do not use LMS but only electronic study materials sent by teacher via e-mail. The situation is almost the same at the Helsinki University of Technology (HUT), but class lectures and exercises are mostly voluntary and all study materials are available on the website of each course. HUT (nowadays a part of Aalto University) is the largest technical university in Finland with potentially 30000 users, but they have not still developed and implemented fully functional virtual e-learning systems (Mazalkova, Mazurek, Kuneta 2011).

At CVUT, which is the largest technical university in the Czech Republic, is implemented online e-learning system based on Moodle but it is not used so often (Moodle – prostředí pro výuku po Internetu 2011). The ratio of courses using e-learning to all courses is still insignificant.

CONCLUSION

It is evident that the electronic form of learning or studying is justified and it has a great future potential especially at universities. Various private educational entities, which offer some kind of education system, are already very active and experienced in the implementation of electronic learning technology. The opposite situation is at universities. Some of them are more active (often technical universities), but most of them has a very conservative approach to the new technologies and their usage in educational process (they do not pay much attention to the utilization of these new technologies). It can be caused by the fact that they do not want to invest financial or human resources into these new forms of education but we think that this step will be necessary for further development of these universities in the near future.

In practice is always needed to solve the complex problems, single person is usually not enough for solving all these challenges, only teams composed of the experts (or engineers) can find final solutions. Pure knowledge does not have to be enough, we have to be able to work together, collaborate with each other and share information. We must not lose contact with others. Even the best e-learning course cannot replace conventional class work led by experienced teacher; it also cannot fully replace face to face communication between teacher and learner and among learners. E-learning is a very good approach, but it has to be a part of blended learning.

Finally, it should be emphasized that education is not only about getting of new information. Education represents a whole complex of elements and activities, through which we achieve a higher level of knowledge. It is necessary to know how to organize new information, analyze and synthesize them. New knowledge and skills must be used and applied in our professional activities, in civil and personal life. Education must positively influence or change our thinking. Educational technology can help to achieve this goal, but the technology itself does not guarantee real quality of education and life.

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IV. METHODS, FORMS AND TECHNIQUES IN DISTANCE LEARNING. M-LEARNING

MULTIAGENT PLATFORM FOR DISTANCE LEARNING

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Abstract*: Internet has brought new challenges for distance learning. For this learning method heterogeneous and distributed architecture is one of the most prominent features. These demands can be fulfilled by means of local intelligence using multiagent systems. In this paper a multi-agent architecture of e-learning environment is presented including basics of it's' implementation. Agent structure, general framework and workflow were designed in order to simplify information flows with the aim to overload the computer resources and to keep system overhead as low as possible.*

Keywords: e-learning, multi-agent framework, workflow, agent implementation.

INTRODUCTION

The omnipresence of Internet has brought new challenges and opportunities for education generally, in distance learning specifically. Here, the learning using computer networks of educational institutions, or in broader sense, including Internet, enable students to access learning resources anywhere, any time. Such type of learning is generally called e-learning.

E-learning uses data and hardware/software architectures that are, by virtue of this type of education, heterogeneous and distributed. To present e-learning resources to students some means of unification are needed, that bring students simple interface connecting them to underlying structures. The

same necessity exists for teachers, who deliver the learning materials in all forms. In order to accomplish these basic aims, the architecture supporting the e-learning process should include at least following properties:

- layered structure with clearly defined interfaces between the individual layers;
- certain degree of local intelligence enabling sufficient flexibility.

These demands can be met by multiagent approach. The presented paper treats possibilities of multiagent environment supporting e-learning activities of students. It is organized as follows.

In section 1, the basic features and tasks of e-learning are summed up. Section 2 describes main features and properties of multiagent systems. Section 3 presents the framework and description of multiagent environment architecture supporting e-learning activities of students. An implementation of such architecture and the workflow is depicted in section 4. In conclusion, further research directions in this field are discussed.

1. BASIC FEATURES AND TASKS OF E-LEARNING

Education is a process of systematic knowledge and habits acquirement by learning. It includes cognition, operational and value perspective. While cognition part of education represents a process of knowledge learning, the operational part includes operations and skills mastering. Education has two basic parties, the teacher and the student. While the teacher performs the teaching and delivers learning pre-requisites such as literature, learning support materials, videos or other forms of visualization etc., the student acquires the knowledge and proves his/hers abilities during the tests. The basic difference between so called "present" learning and e-learning is the form, by which the knowledge is presented to the students and, very often the ways of the testing. The second important feature if e-learning is the type of the student. In case of e-learning the teacher meets with people, who have already set up their life priorities and attitudes.

This is why the basic features of e-learning are to be set up in a different way as in case of "present" learning.

First, the teaching often takes place either completely over distant communication channels or by means of tutorials where the students get the basic orientation. Basic form of knowledge acquirement is accomplished complemented by self-study.

Second the learning pre-requisites are presented as electronic resources both over networks and, even more often, over Internet.

Third, the course seminary works, essays, project etc. are prepared by students in electronic forms and delivered by means of network communication. The evaluation of students' works and knowledge is usually done by electronic tests as well.

Here we have a typical problem of resource heterogeneity complemented by the need to configure the e-learning tools taking the student' habits and priorities into consideration. In principle, we are tackling with the challenge of distributed resource usage and with the necessity to comply with students' distributed priorities and preferences. In our opinion, a rigid hierarchical system is not the right way to solve such challenges. We need some distributed intelligence, which records the priorities of the students, delivers customized proposals to them while enabling the teachers to administer the presentation of learning pre-requisites flexibly. In the next sections we present a multiagent system aimed to solve some needs identified at the School of Business Administration in Karvina (Kubík 2004).

2. MULTIAGENT SYSTEMS

The agents are a topic of many discussions and papers. In our paper we are using the software agents – the software modules based on the agent's paradigm: (Bellifemine et al. 2003):

- Agents are autonomous - they can control their own actions and under circumstances can take decisions;
- Agents are proactive - they do not react in response only, but they can have own goal-oriented behavior and /or take initiative;
- Agents are social - they are able to interact with other agents in order to accomplish their task and achieve the complete goal of the system.

An important characteristic of an agent is the ability. The ability means the characteristic of an agent to perform a task. Agent may have the ability to answer questions, to provide information about its condition, to solve differential equations, to transfer goods with certain size and weight, to look for metal objects and to avoid obstacles etc. We consider an intelligent agent in the form of interactive software component. Its features decide not only on what role it can perform, but also how it can communicate and cooperate with other agents. Wooldridge (Wooldridge 2009) stresses, that the agents

can be looked upon as mean of solving the greatest challenge of at the start of the 21st century – the development of software systems exploiting the potential of interconnected multiple computer systems.

There exist many types of agents, their formal definition and usage. Well-arranged agents classification and basics of formal description published Kubik (Kubík 2004).The social behavior of agents leads the designers to take the mutual communication of agents into consideration. The multiple agent types and their communication methods is not a simple challenge for multiagent system designer. This problem invoked several initiatives of standardization. The best known initiative is the Foundation for Intelligent Physical Agents (FIPA). FIPA published the reference model of agent platform in the years 2002 and 2004 (Abstract Architecture Specification 2002, ACL Message Structure Specification). This first part of reference model published in 2002 deals with abstract architecture specification, the second one describes the rules of agent communication using peer-to-peer model and defines the ACL - agent communication language.

The general agent architecture is often based on a layered agent structure in order to simplify the design and information flows with the aim to overload the computer resources and to keep system overhead as low as possible. In this paper we propose a layered architecture presented in Section 3.

3. E-LEARNING ARCHITECTURE AND OPERATION MECHANISM BASED ON AGENTS

In this section we design e-learning architecture based on the multi-agent technology. We declare the description of e-learning framework, core functions and operations. Many e-learning tasks, for example logging in the course, reading the content of the course, changing course elements etc., could be completed by agents as to reduce the cost of data movement and storage (for example Yong et all. (Yong, Yang, Xue-Xin, Chuang, Hong-Yan 2010). The design consists of three sections, namely framework, agent descriptions and workflow of the system.

3.1 Framework of e-learning system

We divide (Figure 1) the e-learning system into three layers (for example Rui (Rui 2006)), namely user interface layer, agent layer and data layer. User interface layer achieves the logging into e-learning system, the standardization of user requests, the visualization of service results, and the intellectualization of service. The result of logging into system is the creation of user agent, teacher agent or admin agent, depending on the selected role of

the user. Agent layer fulfills service demands (query, analysis, comparison and presentation of selected content of the course) from user interface layer. The main tasks of data layer are to provide data services to agent layer and to maintain local metadata.

3.2 Agent descriptions

In our design, there are seven agents, namely user agent, teacher agent, admin agent, task agent, course agent, data management agent and data source agent.

- **User agent, teacher agent, admin agent.** These agents are located in the user layer, created by user management agent when user logs and destroyed when user exits. Concrete agent creation is depending on the role selected by the user. The main function of these agents is to aid users to acquire e-learning services better. That includes: the sending request to the request list, clarifying service request by interaction with user and displaying the results in the form of user's preference.
- **User management agent.** This agent is located in the agent layer and mainly achieves the following function: managing the user agent, offering the query of sharing results, managing user profile base and sharing knowledge base, finishing certain tasks instead of user according to analyzing user's historical behavior record and carrying out some intelligent services (e.g. collaborative recommendation).
- **Task agent.** The main function of this agent is to assign the tasks based on the matchmaking between requests and services. That includes: assigning request to the corresponding service unit based on matchmaking between user's requests and service items and managing request list and service list.
- **Course agent.** The main functions of this agent include: aggregating the relevant data in the form of the course content according to the user's request, and providing the presentation function, such as opening the lessons, testing the users' knowledge, presenting the learning documents, providing a place to send the homework's, analyzing the studying results etc.
- **Data management agent.** Main functions of this agent are routine maintenance and implementation of the tasks. Routine maintenance achieves the monitoring of various data sources, integrating the metadata through the ontology mapping, summarizing the local metadata of various data sources, establishing the global metadata

stored in the metadata base which provides the call for other service units and maintaining and updating the metadata base. Implementation of tasks receives assigned task about the data query, sends the task to the corresponding data source agent and integrates the results.

- **Data source agent.** This agent manages the various types of data resources. That includes structured, semi-structured data and unstructured data. It provides services to upper layers. The main functions of this agent are receiving the calls of the data query, to provide the data sets for query and analysis... It also establishes and maintains local metadata, and sends the local metadata to the data management agent.

4. E-LEARNING SYSTEM WORKFLOW IMPLEMENTATION

We implemented the principles of our architecture with the Microsoft .NET platform. The proposed architecture of e-learning system based on the multi-agent approach runs according to the workflow as follows.

After users logging on the e-learning system user's identity is verified. User management agent automatically creates a user agent, teacher agent or admin agent for every user according to the selected role. The structure of the agents' source code is presented in Figure 2.The user agents are also responsible for the standardization of service requests and the visualization of results. User agent's lifecycle ends when user exits the system. When a user requests the service, the user management agent receives the request message from the user agent and tries to retrieve the similar sharing knowledge from the history stored in the sharing knowledge base. If it exists, the user management agent returns the result to the user. This avoids the negative impact on the system performance when similar requests appear. Otherwise, the request is sent to the task agent for farther processing. At the same time, the user management agent can predict the service requests of the user according to the user's history behavior records stored in the user profile base.

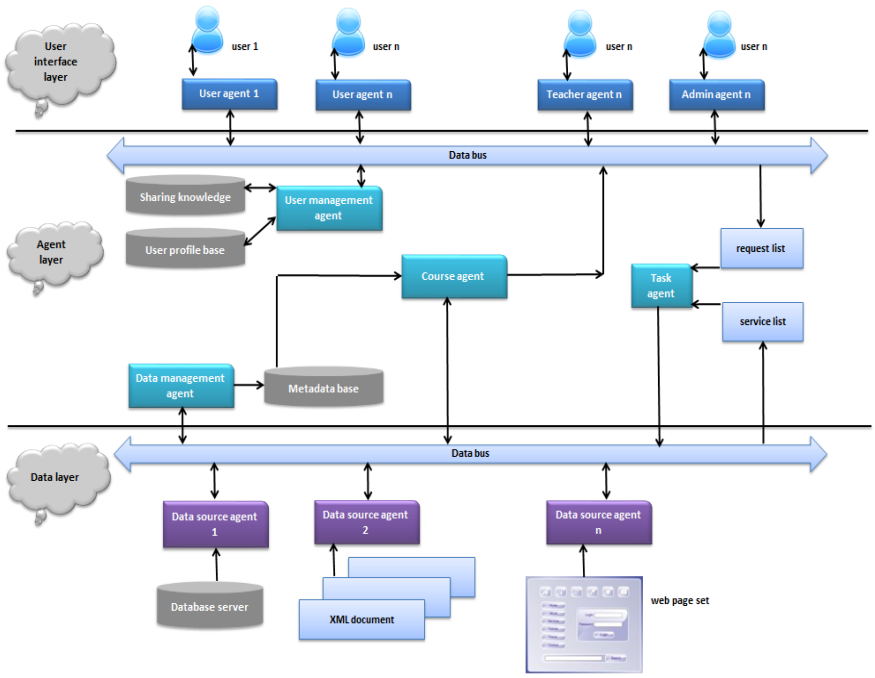

Figure 1. Architecture of e-learning system *(source: own).*

```
public class UserAgent
{
// SubmittedHandler is the delegate which is associated
// with the event named OnSubmitted. It is usual but not required
// to start the names of events with the word On
public event SubmittedHandler OnSubmitted;

//when handling events and declaring the delegate, the first parameter
// is the object generating the event, the second one is a type
// inheriting from EventArgs, usually defined by the user as it is
// the case here.
public delegate void SubmittedHandler(Object o,InfoEventArgs bi);
//the next piece of code shows how this class would generate an
// OnSubmitted event
public void submit(int position, int type)
{
//this if statement actually checks that there are subscribed
// methods that want to receive events of type OnSubmit
if(OnSubmitted!=null)
{
//the event args would also include some info with regards to
// the efficieny of the submission, for example, if it was rejected,
// if it won any elements, etc.
InfoEventArgs bia = new InfoEventArgs(position, type);
OnSubmitted (this, bia);
}//if
}//submit
}
```

Figure 2. User agent and the event creation with .NET *(source: own).*

After logging in the e-learning system the user agent establishes the TCP/IP connection (Figure 3, 4) and sends an ACL message (Figure 5) with XML elements from XML user file (Figure 6, 7) to the course agent. XML user file consists of many elements describing the users' content of the e-learning course (type and position of menus etc.). This ensures to store the users view of course content for each users logging into system. The course agent after the receiving of ACL message from the user agent compares the elements from XML user file (custom values) with the elements of XML course file (default values) and highlights the differences. This ensures the highlighting of new elements for the user. The XML user file is unique for each user and the course. The content of the XML course file could be changed only by the teacher agent or admin agent and it is unique for each course. When user exits the course the XML user file is saved with actual values of the course elements. When teacher or admin exits the course the XML course file is saved with actual values of the course elements.

Task agent puts the received service request into the request list, and then sequentially matches the description of the request in the request list with the record of service in the service list. Task agent sends the request to the corresponding agent according to the degree of matchmaking and the assignment strategies. Agents receive the service request sent by the task agent, complete the assigned tasks and directly return the result to the request initiator – to the user agent. The results are also stored in the sharing knowledge base.

CONCLUSION

Distance learning support has to cope with resource heterogeneity complemented by the need to configure the e-learning tools so that it takes the students' habits and priorities into consideration. Instead of rigid hierarchical system we proposed system with distributed intelligence, based on software agents. The platform proposed includes several types of agents fulfilling specialized tasks and using internal intelligence and mutual communication. The example of a typical agent internal structure has been presented. Presented solution will be a topic of further research into optimal computer resources exploitation with minimal overhead and also into agent intercommunications based on FIPA standards.

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PROBLEM BASED TEACHING IN E-LEARNING. A CASE STUDY

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Abstract: *The greatest advantage of e-learning in the asynchronous mode simultaneously is the greatest obstacle in the introduction of the problem based teaching methods. The free choice of time and place of learning by the student simultaneously makes impossible the observation of his work by the teacher, and consequently disables the proper management of the problem solving process. Due to that it is necessary to use some substitutional means eg. multistage tasks accessible in the mode of multiple repeating of the communication loop: student (the solution) - teacher (the comment), tools of the continuous documentation of activities - the blog and the journal. It is also worth to reorganize the structure of the problem so that the proper advices can be given before the drawing up the main problem to prepare the student to the work over this issue.*

Keywords: distance learning, e-learning, the problem based teaching, instructional design.

INTRODUCTION

The leading idea of the 2.3 chapter of the second volume of the manual of the psychology *Psychology. Core Concepts* sounds:

According to the cognitive psychology, some forms of learning need to be explained as changes in intellectual processes and not as behavioral changes in itself. (Zimbardo, Jonson, McCannl 2010: 156).

It means that at least a part of the learning process must take place in the mind of a student what is caused by the own needs of the learner. Problem methods - focusing on a student and his own work realize such teaching methods. The classical problem method, based on the J. Dewey's researches

and developed by B. Nawroczyński, is divided for four stages: a creation of a problem situation, formulating the problems and ideas for its solution, verifying solution ideas, ordering and adaptation of the obtained results in new assignments (Okoń 2003, p. 262). A teacher and a student are involved in all these stages, though to a different extent. The construction of a problem situation is obviously the role a teacher but the further stages are mostly the domain of a student supported by the teacher. Though the problem method "consists of the continuous interaction between a teacher and students and the aim of this interaction is to activate a student's powers and to raise his faith of himself and convince that he is able to solve more and more brain teasers" (Okoń 2003: 262-263). The necessity of the constant cooperation between a teacher and a student during the realization the methods concentrated on a student (particularly of the steered exploration or a student by questions which are the classical problem method variants) is stressed also by G. Petty in his bookguide for teachers (Petty 2005). Hence it might be supposed that even if problem methods refer to changes in student's intellectual structures though they cannot be realized in the solitude.

The distance learning supported by the computer technology and by the Internet, known as an e-learning, has many advantages but the most important one is the asynchronism – a possibility of choosing the time and place of learning by the student aside from the teacher. It does not need (and in the online mode it usually does not happen) the meeting in a concrete time and place of all persons involved into the process of learning and the didactic process is going on anyway. Unfortunately, this great advantage of the e-learning has its dark side: the teacher cannot observe his students working:

…in e-education the student does not exist. Instead of a student, there appear his posts on fora, solutions of open assignments and other works, test results, system log records, perhaps some mails and an image pinned to the profile […] the teacher does not see the student, only receives his works, so it is impossible to determine whether the student really understands the topics or is really able to fulfill the instructions. (Rudak 2010: 87).

So we reached the point, wherein it seems that the realization of problem methods in the distance learning (including the help of the computer and the Internet) is not possible. If direct observation of the student work is impossible, impossible is also a reaction on his activities, and at least not then when such a reaction is the most necessary. The interaction based on the e-learning platform environment and the network communication tools is postponed (eg. a call for help sent by the student waits for the teacher's reaction who can read it any time later on – similarly as the student, the

teacher also uses the asynchronism and chooses the time convenient for himself), so the problem solving process (learning) is divided by the awaiting periods. It is also important that the person initiating an interaction during the realization of the problem method in traditional conditions (face-to-face) can be the teacher: he can not only react to the direct question of the student but also on the basis of his own observations. Sometimes even in a situation when the student does not yet realize that he needs a help. Such activity of the teacher in the distance learning is impossible so the only option is to wait for a signal from the student. Does it mean that a problem based teaching is impossible in the on-line learning mode?

In the chapter 1 there are shown examples of the naive approach to problem based methods realized by standard e-learning platform tools and by the comment concerning their effects. In the chapter 2 there are explained guidelines concerning the design of elements of the problem based method which are to be used in an e-learning. These guidelines have been worked out on the ground of experiences (among others described in the chapter 1) and are still the subject of the continuing experimental research.

1. SIMPLE PROBLEM BASED TEACHING STRATEGIES

Problem methods can be realized by very modest resources. Practically every open assignment which solution is not based on a repeating of the well-known procedure, but demands a new unknown earlier approach to the problem, is indeed an instance of the problem based method. By this way were treated (and properly formulated) open assignments proposed to students of the University of Warsaw in the e-course *The basis of mathematical modeling for non mathematicians* (offered as a general university course for all students of humanistic faculties; the author and coordinator of this course is the author of this article). The example of one of these assignments altogether with comments concerning solutions is described in the chapter 1.1.

The second example, described in the chapter 1.2, comes from the same course. It concerns especially prepared problem discussions which took place in the framework of this course.

The issues presented in the course were new for all participants. They disposed the basic mathematical knowledge acquired in a high school and none of them has ever participated in a course of the modeling (mathematics is taught in a traditional theoretical manner at school) and in their studies

programs there were no subjects concerning mathematics – this was the formal requirement of the participation in the course.

1.1. Open-ended tasks

This what enables mathematical models construction is the ability of observation of the modeled phenomenon. Accordingly, the modeler must judge what is worth to observe and choose these observable elements of the phenomenon which influence on its form and to define the real relationship between the chosen changes and effects of these changes. The acquirement of these skills must happen by the way of researching and experiments analyzing as the *giving methods* cannot be used in such a case (as the knowledge of the all possible cases cannot be passed – a student must on his own master the art of analyzing a phenomenon such as it is, so that he would be able to transfer this skill to any other situation).

As a basis for developing the ability of experimenting and the skill of observation the following exercise is proposed:

Carry out the following experiment: on a flat, the best if shaded, place (a table, a floor etc.), put some spherical object (eg. a ball – the bigger the better, but even a ping-pong ball will be fine). Then light it up with a strong stream of light (from a torch or a desk lamp) and observe its shadow changing with the source of light movements (up and down, closer and further). The result of the experiment is to be the observation record noted in mathematical language: a proper recognition and calling the figures formed by the observed shadows.

The mathematical sense of this assignment is hidden in the properties of a cone sections at the plane (a cone is the shadow thrown by the sphere lighted up by a punctual source of light and a plane is a surface on which the sphere is placed), so changing the position of the source of light it is possible to obtain all the cone curves (circle, ellipse, parable and hyperbole) as edges of the shadow of the sphere. Students met these curves in their course of mathematics at high school and as graphs of the function (parable and hyperbole) or as geometrical places of the points (circle and ellipse), but not as sections of the cone (the assignment is the more distant from the theory as the cone is practically invisible during the experiment).

The problem situation, that the students were faced to, first of all based on the exploration of the subjection between the direction of the illumination of the sphere and the changes of the figure formed by its shadow, appeared very difficult for the most of students. For example in the summer semester 2011 the solution was sent by 93 students and only 3 of them recognized all four

curves. Whereas it is necessary to note that almost all correctly constructed the experiment (Fig. 1).

Figure 1. Documentation of the experiment with the illumination of the sphere

(photo: Katarzyna)

The most frequent solution was based on the lighting of the sphere from the above receiving the shadow in the shape of a circle, and afterwards on a shifting a bit the source of light into the side receiving the ellipse. Unfortunately, this was the end of the experiment.

In students' solutions a next step missed – shifting the source of light in the way that illuminate the sphere from the side at the height of its centre (what would give the parable) and below the centre (to receive the hyperbole). What is even more astonishing as many students formulated correct conclusions:

The more the angle of incidence of the light [in relation to the basis] *draws on to the right angle, the shadow* reminds *more a circle – the more removes away – it appears as a more oblate ellipse.* (Beata)

The sharper is the angle of incidence, the longer is the shadow. (Robert)

However, even after such conclusions there were no natural (for the author of the mathematical model) activities checking what happens when the mentioned above angle of incidence of the light has a zero value or even more when it is on minus.

This example shows clearly that the interaction with the teacher in the problem method (the assignment was offered by the mechanism of the open assignment at the Moodle e-learning platform – as a single message containing files with photos and the description of the teacher's comment) is a crucial element of the whole method. In conditions when the student observation is possible a teacher can give a piece of advice (eg. „move the torch further") during the experiment what probably can be sufficient in achieving a full success. Therefore a comment after the realization of the experiment has not such a meaning because students (even if they pay attention on it) do not need to remember it and to follow by their own conclusions in similar conditions next time and to check what happens when certain parameters will reach limiting values.

1.2. Discussion forums

Open assignments can be an organizational basis for problem methods concerning convergence problems. However, to divergement problems it is more accurate to use other tools. In the e-course *The basis of mathematical modeling for non mathematicians* mentioned above there were used accordingly discussion forums. The project assumes students' activation by the creation of models of occurrences having a very general description. It seemed that in compliance with the course contents the discussions (in small groups) would have begun from the qualification of modeling conditions: limitations of the range of the model and setting the necessary simplifications to follow consequently to some form of the mathematical model.

Discussions on forums were not very intensive. For example in the most multitudinous discussion in the summer 2011 edition of the course took part only 23 students out of 131 real participants (all those who did not give back open assignments and did not undertake tests are excluded).

This discussion referred to the model of the bird's wings movement during the flight:

A bird moves the wings to fly - this is a banal statement, but… how does it look the wings movement causing the flight of the bird? How to model the movement of bird's wings?

The mathematical problem refers to two problems: the model has to be periodical, what means that it needs the use of the periodic function and must be smooth (the function at least differentiable) to take into account a braking and dispersing of the wing at every change of direction.

Discussions however did not go on in the planned direction. Students had problems with the simplification of the phenomenon and with paying

attention to the most important elements. They fixed on seeking biological, physiological conditions of the bird flight. Different phases of the flight (soar, the glide…) were examined. Similarly as in the example with the open assignment it lacked the teacher who would have directed the discussion (in this case the lack of interaction with the teacher who would control the discussion was a proper operation as its aim was to check the skills of working and discussing in a small group). It is easy to imagine that the minimal help of a teacher based on indication of materials in the course, which refer to the general strategy of building the mathematical model, could have directed the discussion to let the students easily get to important (from the point of view of the mathematics) problems. Of course on condition of the more numerous participation of students in the discussion.

2. PROBLEM BASED TEACHING STRATEGIES IN E-COURSE

The appliance of problem methods in the e-learning generates many difficulties. Ideological bases were precisely described in different publications, eg. (Horton 2006), (Clark, Mayer 2008) however they did not show the model of realization of such a method in the environment of distance learning with the utilization of the Internet. The core attention is paid on a content of such a method. R. C. Clark and R. E. Mayer think that teaching of *thinking skills* is considerably more effective in conditions of the corporate training than in the academic teaching (Clark, Mayer 2008, p. 321). Focusing on job-specific trainings they talk over the only one form of the problem method: the case study, as the most effective. W. Horton adds moreover virtual laboratories and educational and simulatory games (called: *role-playing scenarios*) (Horton 2006, p. 126). In both cases the advices on realization of these methods are so general that they do not reflect the specifics of the e-learning and apply to both the traditional and the distance teaching. Particularly there is no solution of the problem of the lack of possibility of the observation of the student during his work and consequently do not give answers to the question: how to use problem methods in the e-learning.

In following subchapters advices on realization of the classical problem method in the asynchronous e-learning will be presented. It is the hardest case for usage of these methods. In a synchronous mode, and the more even in a mixed teaching (blended learning), the main stages of the problem method can be realized in the presence of the teacher, so there is a possibility of the natural observation and control of the student activity.

Given advices get out of the theoretical analysis of needs of the problem method and limitations of the asynchronous environment of e-learning and they were not checked in practice yet. However, they had been a base for changes introduced to the following edition of the course *The basis of mathematical modeling for non mathematicians* which will begin in the winter semester of the academic year 2011/2012. This will be a base to the improvement of the realization of the classical problem method in the mode of e-learning.

2.1. Multistage problems

The open assignments, eg. in such a form as on the Moodle e-learning platform, look eg. (Rice, 2008), usually allow sending the solution by the student and the comment by the teacher. Afterwards, the communication is closed. Such a form of communication is not suitable for the realization of problem methods (look subchapter 1.1). However parameters can be set in such a way to allow repeating the communication by this activity. Then the process of answers' transmission from the student to the teacher and a feedback comment (from the teacher to the student) can be repeated as many times as many it is necessary.

An advantage of this form is its ease of realization for both sides. The teacher sets only the proper parameters in the moment of the deposition of this element in an e-course, and the student proceeds such as in a case of an usual assignment which can take up many times. In this mode also multistage assignments can be presented to students: after the correct solution of every part, the teacher gives the content of the next one. This is much better form than a straight giving off all the components of the multistage assignment because very often the following questions/problems suggest solutions of the previous stages.

Unfortunately, this form has a serious disadvantages. A technical defect is the necessity of putting special efforts to keep the whole of the communication. Usually, the following solution takes place of the previous one, and then there is no possibility of analyzing own solutions and committed errors and there is no option to go back to the teacher's comments. However, a considerably more crucial disadvantage is the mode of communication. In this case the student must begin the exchange of messages. The teacher can do nothing as long as the student does not decide on sending the solution or at least a piece of the solution. And this significantly makes difficult supporting the student in his actions and can be the reason of the lack of effects of using the problem method.

2.2. Continuous documentation

A greatest difficulty in the realization of problem methods in the e-learning is the lack of possibility of observing a student by a teacher. However, using properly the tools offered by the technology (eg. by the e-learning platform or independent web applications) one can find the method of avoiding this problem. The mechanism of blog is suitable for this purpose. Its advantages present P. Shank writing that the blog serves to:

…keeping a record of thoughts, understandings, insights, and resources augments learning for the blog author and those who read it. (Shank 2007: 129).

Applications serving the blogs make also available the possibility of commenting the opinions, so the teacher can introduce his own remarks and advices any time not waiting for the direct question from a student.

Similar functions also offer journals being the components of e-learning platforms (eg. the journal from Moodle - look (Rice 2008)). In this case the student uses a journal and notes put in it can be commented any time by the teacher. However, in contrast to a blog, the notes in a journal are visible only for their author and the teacher and not for other students.

Blogs and journals despite their advantages are not an ideal solution of the problem of the necessity of communication to the full realization of the problem method. The utilization of these tools needs the additional effort of labor from the student who must describe its own achievements, thoughts, jot down occurring questions and doubts, note difficulties. The student must be forced to the systematical maintaining a blog or a journal. Without this activity this method will not fulfill its role. A second disadvantage is basing on the written statements of students, whereas not all of them have suitable communication skills. So, some misunderstandings might happen and make difficult the proper teacher's comments.

2.3. A net of advices

The help of the teacher, during the student's struggle with the problem, is based on prompt advices in proper moments. Such advices direct the student to the proper path of thinking when the student follows too far away from the expected solution of the problem. In an e-learning the *proper time* of giving an advice cannot be recognized, so the necessary remarks must be passed in other time. The properly worked out advices can be delivered before the main problem is put out. Of course they need to be formulated on a very general level as they will be distant from the context of the main problem and will be presented as separate problems but with the strong suggestion that they refer

to that what will be a main plot of considerations. The proper for this aim are the mechanisms of blocking the access to the following materials, if the student does not confirm his own skills and the knowledge in short tests. By this way it is possible to hide the main problem behind several advices. A student will be first equipped with certain information and skills useful in solving the problem and afterwards when he passes the specific examination from preparing contents then he will receive the main task. One can suppose that the memory of the student and his ability of associating will enable recalling the proper advice when it is necessary. Of course the student will have to adapt its general form to a concrete case.

CONCLUSION

There is no natural way of transferring the classical problem based method to the e-learning being realized in the asynchronous mode. The reason is the greatest advantage of the distance learning: freedom of choice of time and place of learning by a student. This causes the difficulty in student observation and supporting him in proper moments what is the platform of problem methods. Therefore the introduction of such methods demands undertaking the additional activities in designing, implementation and leading the e-course. It is necessary to use all the technical tools which let, though partly, to restore the possibility of control student's activity (eg. blogs, a journal, assignments with the multiple solutions sending) and to introduce a system of advices transfer to let a student use them in natural way exactly then when he is going to need them. At last it is also necessary to enable consultations with the teacher as not all the difficulties the student will meet are predictable.

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THE QUALITY OF E-LEARNING - THE SERVQUAL METHOD

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Abstract*: The paper focuses mainly on problems of assuring e-learning quality in tertiary education. In the paper the possibility of implementation of the Servqual method for measurement and assessment of e-learning quality at different stages and levels of its execution in a college or university is discussed. The realization of e-learning in a college or university is a complex undertaking, and all its elements influence its quality. The quality of e-teaching can be measured by a degree at which the service (e-learning) meets the requirements and needs of the client (student, employee). The paper presents advantages and limitations of the Servqual method as it has to be adjusted to the needs of e-learning.*

Keywords: E-learning, quality, project, Servqual.

INTRODUCTION

Development of information technologies is changing our reality and we are now on the verge of a revolution which is already creating a new kind of society, i.e. an information society (Tadeusiewicz 2008). The birth of such a society means new challenges for higher education institutions, which are expected to cater for the needs of the society relentlessly striving after better

education. Neglecting the demands of digital civilization may result in marginalization in the developing society.

In the new reality, e-learning with its tools and multimedia is going to become the proper way of delivering knowledge. In fact, e-learning already is a fast-developing segment of the educational market, and distance learning becomes a new way of gaining knowledge, alternative to traditional education and the existing educational structures (Nahotko 2006).

The way in which distance learning makes use of information technologies may differ significantly, from boosting traditional education with electronic teaching materials to classes fully conducted online. In Poland blended learning seems most popular. Its aims are not limited to just supporting or facilitating traditional classes with computer-mediated instruction, but it aspires to effectively replace part of traditional classes with distance learning and teaching (Bronk et al. 2006), (Walasek et al. 2011a), (Walasek et al. 2011b).

At the same time the commercial market, with all its rules, enters the academic world. The presence of enterprises providing a similar or even the same type of services provokes verification of higher education institutions' performance. Furthermore, the forecast demographic trends and, in the process, gloomy prospect of empty lecture halls as well as potential effects of such a 'cataclysm' for universities may cause even more fierce competition or students among higher schools (Mischke 2009), (Wodecki 2010).

A university which provides a better planned and organized teaching and which constantly refines it educational offer will be able to achieve a competitive edge. To win a higher school will have to become a professional enterprise and provide service in a competent and attractive way. With the competition growing at fast speed, didactics is to become a product which should interest and then retain a potential candidate and then a student.

Young people widely use the Internet as a means of entertainment and a source of information (Bugaj 2008). Will they be willing to actively use it for distance education? There is no explicit answer, but they are a generation for which the Internet is a matter of routine. Therefore, it could be assumed that a student should expect the presence of information technologies in his studies and distance learning may be able to cater for those expectations.

The new situation on the educational market may give universities a chance to rightfully incorporate e-learning into their curricula. Yet, the implementation of distance learning is a complex task. To be successful, it requires, among others, effective quality management.

It should be remembered that the client-student has his own requirements and needs and he will expect the product-service to be of proper quality. A quality that will meet his demands which are often determined by the development of information technologies. His assessment of the service quality will boost his satisfaction or not, which, consequently, will affect the university's reputation.

1. DISTANCE EDUCATION AND QUALITY

E-learning is not a self-contained and independent entity. It belongs to the whole, which is the university. The university then is part of a schooling system etc. Thus, e-learning functions in a certain environment which facilitates its development, but also causes uncertainty and even anxiety. If we are to shape and assess e-education, we have to know and understand its environment.

The environment in which a university exists can be divided into internal and external, likewise in any other institution (Griffin 2009).

The external environment (macro and micro environment) comprises all external factors affecting the implemented e-learning. The macro environment has the following dimensions:

- economic – condition of the financial and economic system in which the university operates,
- technical – changes in science and technology lead, among others, to the development of information technologies,
- sociocultural – features of the society in which the university exists,
- legislative-political – legislative functions of the state determine, among others, the relation between the state and higher education institutions,
- international – globalization of education.

Micro environment comprises other entities which may directly affect a given university:

- competitors – other higher schools which compete for resources such as grants, candidates etc,
- clients – anyone who makes use of the service provided by the university,

- providers – institutions that provide the university with resources, e.g. banks, high schools, etc,
- regulators – institutions which may shape and affect the solutions adopted by the university, e.g. accreditation boards, student organizations, employer organizations,
- allies – higher schools which cooperate with each other, e.g. in a project.

The internal environment of e-learning consists of forces and conditions functioning in a given university. These mainly include:

- the authorities of the school, who manage the school and its resources, develop the school strategy, e.g. e-learning strategy,
- the academic staff, with their expertise and commitment to teaching,
- university culture, which shapes the acts and norms of the academic staff and the students.

All of the abovementioned elements of the environment directly or indirectly influence the realization of the e-teaching/e-learning process taking place at the university. Thus, they further influence the adopted solutions and the way in which the client perceives the service (e-education).

Nowadays, there is no one universal definition of education quality. This results from the multidimensional aspects of didactics and the changes which take place in its environment. As the quality becomes a decisive factor for higher education institutions, many of them show growing interest in quality management systems which comply with the ISO 9001:2008 norm (Michalska-Ćwiek 2009), (Roszak 2009). Concurrently, the issue of education quality is an important element of the solutions discussed in the international forum – Bologna Process, European Higher Education Area (Karkoszka 2009).

Similarly, because of the huge variety of online teaching and learning forms as well as the lack of academic e-education model in Poland, it is very difficult to define distance learning quality. Developing assessment criteria for the quality of e-education forms would allow teachers to assess their own e-classes and would help school authorities to evaluate e.g. didactic units. Attempts to develop such standards were undertaken by Association for Academic E-learning (Zając et al. 2009). The assessment criteria for the quality of e-classes have been publicly available since October 2008 at the Association's web page: http://www.sea.edu.pl/kryteria/.

Looking at e-learning as a service and following the terminology of quality management, it can be assumed that the quality of e-education can be measured by the extent to which a service (e-education) caters for the demands and expectations of the client.
The main recipient of e-education is the student for whom an e-course is a 'product' on offer. The student is the external client of e-education. The academic teacher who develops an e-course and conducts online classes is the internal client.

Both categories of clients co-exist in the process of e-learning/e-teaching [fig. 1] and they both assess the process according to their needs and expectations. The assessment is subjective and changes with time. Furthermore, satisfaction of the student and satisfaction of the teacher are mutually dependent.

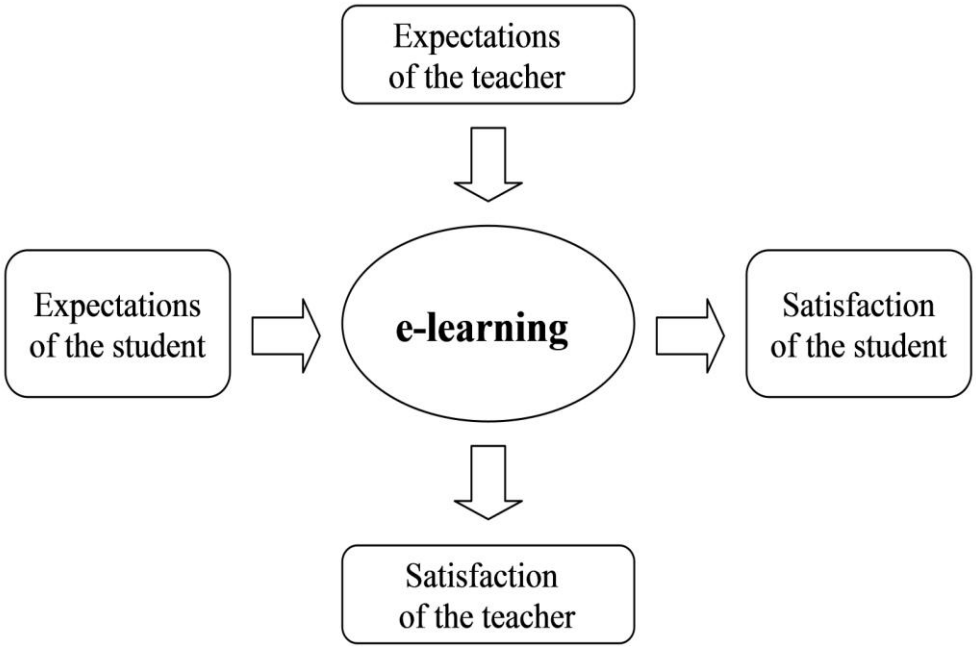

Figure 1. E-learning process and its clients
Source: own, based on the authors' research

While analysing e-education quality from the client's point of view, it should be remembered that students differ in their intellect, system of values and approach to gaining knowledge (Seredocha 2007). The commitment of the client-teacher to providing high-quality service will depend, among others, on the position of e-learning in the university, his feeling of security (author's

rights), the way in which he is remunerated for his work, and opportunities for further professional development.

Summing up, the quality of e-education provided by a university can be discussed in two categories:

1. Project quality, where ‘project’ means implementation of e-learning. The quality is connected with proper management of the project and observation of the environment. Project quality is determined by constant improvement of the adopted solutions.
2. Service quality, where ‘service’ is an e-course developed and conducted by the teacher.

2. THE SERVQUAL METHOD

Together with the growth of interest in e-learning, more attention will be paid to the tools enabling the evaluation of e-education quality. One of the methods measuring service quality in a number of areas is the SERVQUAL Method (SERVices QUALity), which was developed in the 1980’s by A. Parasuraman, V. A. Zeithaml and L. L. Berry (Parasuraman 1985), (Parasuraman 1988).

The measurement of service quality from the client’s point of view forms the basis for this method. It takes into account a number of features characteristic of the service in question. Before the client experiences the service, he builds expectations for the service and its quality (expectations quality). The expectations are shaped by e.g. previous experience, exchange of information, personal needs and beliefs. While making use of the service, the client compares his expectations to what is being offered to him (perceived quality).

The service quality Q is calculated to be the difference between the perceived service quality P (P – Perception) and the expected (ideal) service quality E (E – Expectation):

$$Q = P - E \qquad (1)$$

A negative result, $P < E$, means that the client’s expectations have not been fulfilled and the provided service does not satisfy the client (unsatisfying quality). A positive result, $P > E$, means that his expectations have been surpassed (surprising quality). In case when $P = E$, his expectations have been fulfilled (satisfying quality).

The methodology of SERVQUAL makes use of two surveys, each containing 22 appropriately selected statements which are assigned to 5 categories (dimensions) of the service. In both surveys, respondents decide with the help of the Likert's scale to what extent they agree with the presented statements. The first survey, given to the client before he makes use of the service, aims to assess his expectations for the service quality and to determine value E. The client assesses a service which is ideal in his opinion. The second survey, which is based on the same statements but this time regarding a specific service, aims to assess the perceived service quality and to determine value P.

The statements included in the abovementioned surveys are assigned to five categories (dimensions) of service quality (Parasuraman 1988):

- tangibles – the appearance of premises, equipment, mass media, staff,
- reliability – ability to provide solid and trustworthy service,
- responsiveness – speed of acting and reacting to the demands of service recipients,
- assurance – qualifications and expertise of the staff; ability to rouse the client's trust,
- empathy – identification with the client's needs.

In the survey, the statements are grouped into sets of 4 or 5 so that each set can be used to measure one of the abovementioned categories. At the third stage, the client is asked to divide 100 points between the five categories thus indicating their weight in creating service quality.

Survey results can be interpreted in two ways. The first interpretation makes use of the so called unweighted SERVQUAL result, which is the difference between arithmetic means of perception and expectations results received from all respondents for all the statements or only those included in specific categories. The second interpretation makes use of the weighted result. Within a given category, the received responses are weighed with the points assigned to the category by the client.

Both ways of interpretation allow us to detect variances (gaps) which may appear between perceived and expected service. Therefore, we are able to indicate the areas in which the client is dissatisfied with the service, assess importance of each category in the eyes of the client and take steps to improve the service.

The categories suggested by the authors of the method are by no means universal. It should be remembered that every type of service, including

distance education, is unique. For this reason the classic method needs to be modified by means of adjusting it to the service features and the service provider's needs e.g. by offering own categories and survey statements.

3. SERVQUAL AND E-LEARNING

SERVQUAL is not only a tool allowing us to evaluate service quality from the client's point of view, but it also helps to analyse the factors which have influence upon the service – both at the level of the whole organization and at the level of direct contact between the client and the service. Thanks to its multi dimensions, the method can be applied to research problems related to e-education quality which appear at the stage of incorporating and implementing e-learning in a higher school and, later, during online classes.

The usefulness of SERVQUAL for e-learning also results from the service quality model adopted by the method and the model-related concept of gaps (variances) (Parasuraman 1985). The gaps describe situations in which the provided service quality differs from the service quality expected by internal or external client. Such gaps may appear at any stage of the service life cycle. They will also appear in the process of e-learning so they should be taken into consideration during the implementation stage.

Drawing on the conducted research, the authors of the SERVQUAL tool enumerated five gaps concerning service quality (Figure 2).

a. **GAP 1. The difference between the client's expectations and the way in which the organization authorities perceive these expectations.**

The gap indicates the extent to which the authorities know and understand what the client expects from the service on offer. Managers are not always able to determine factors which influence the way in which the client perceives the service.

In case of e-education it will then be important to research students' real expectations for e-learning, the degree of its acceptance, the level of knowledge about information technologies etc. The research is one source of knowledge. The other is the information coming from the academic staff that teach online and have direct contact with students. Thus they can pass their comments to the authorities if the information flow in the organization is not hindered in any way. If the concept of e-learning formulated by university/faculty authorities is based on incomplete information, e-education may be negatively affected because it is the authorities who create the

environment in which e-education exists. Ignorance will lead to a decision about implementation of e-learning, but the concept of service might not be 'compatible' with students' and teachers' expectations and what is important to them.

The extent and method of research as well as frequency and quality of contacts between decision-makers and clients can narrow or widen the gap.

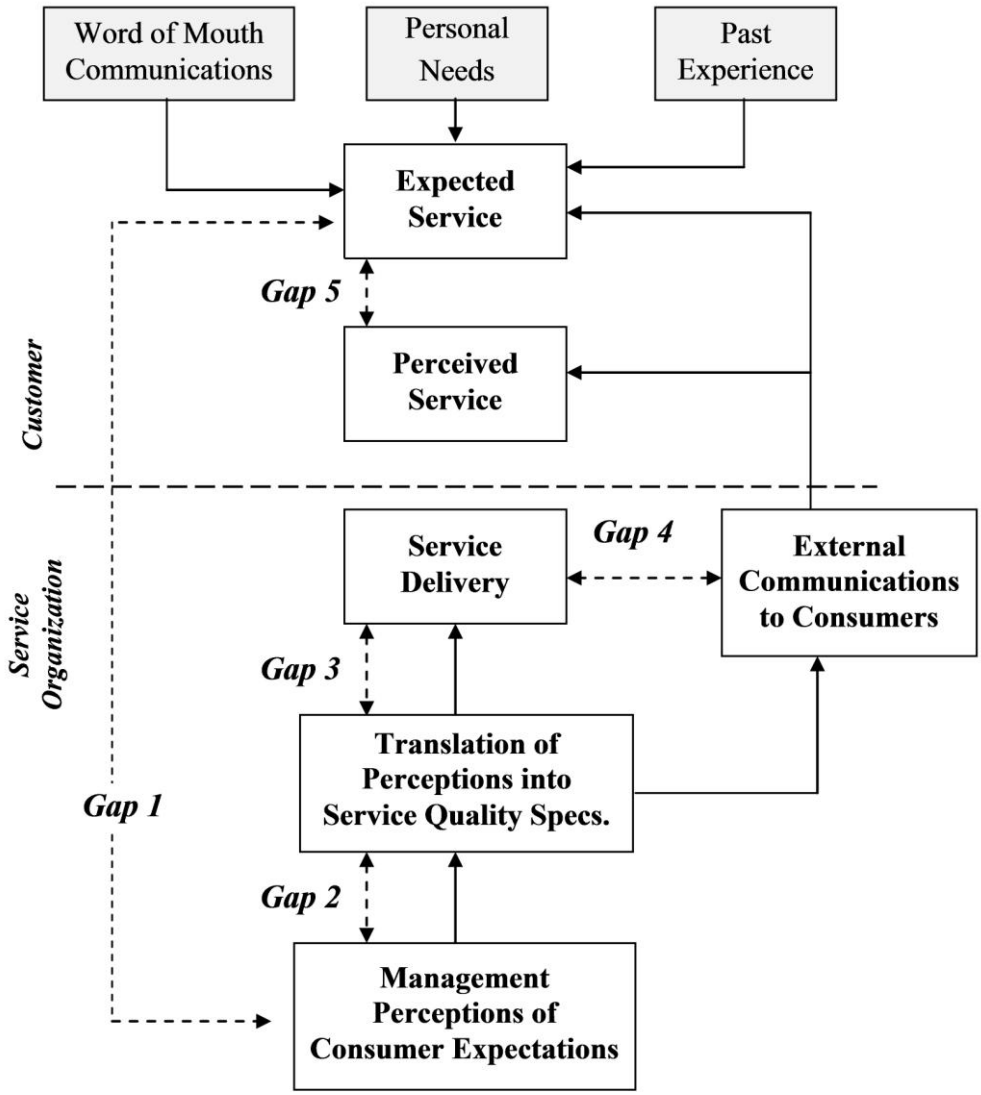

Figure 2. Model of service quality of e-learning process [based on Parasuraman et al., 1985 and the authors' research]

b. GAP 2. The difference between the client's expectations as perceived by the authorities and the service specification.

This gap shows the variance between the service concept framed by the authorities and the service scheme being developed in the organization. In case of e-learning, it is recommended that the authorities should be involved not only at the stage of formulating the concept, but also later, when the ideas are implemented. And this should be a long-term involvement, not just temporary or opportunistic.

To minimize the gap influence on e-education quality it is essential to adopt proper e-learning strategy, standardize all actions, develop service quality requirements, e.g. for creating and conducting online courses, assigning suitable resources to e-learning, including financial resources such as the cost of information technology infrastructure and its use, the cost of creating and implementing teaching materials (e-courses), the cost of remuneration for e-methodologists and e-teachers. The authorities should be prompted to remove all obstacles which might be blocking service delivery or causing its depreciation in the academic environment and which would, consequently, prevent proper service delivery.

c. GAP 3. The difference between the specified and provided service.

The gap indicates variances appearing between the service scheme and service delivery. In case of e-learning, it might turn out that, despite university formal regulations, the offered service diverges from the prepared model. It is the academic staff who might play the decisive part here and change the service quality. E-teachers may not be able to provide service of the expected quality, e.g. due to lack of proper training or methodological support, limitations in access to information technologies or because they use out-of-date solutions. The employees might not be willing to become involved in the service as, for instance, they are not sufficiently remunerated for their work or they see a conflict between students' expectations and the requirements adopted by the university.

d. GAP 4. The difference between the provided service and the service promised by an organization.

The gap is connected with external communication of the organization. It shows differences which might appear between the delivered service and service quality promised by the organization. Advertising the service raises the client's expectations.

Therefore temperance in creating the image of e-education is recommended, especially when e-learning is in its infancy at the university. It might happen that the higher school will not be able to fulfil the students' expectations which have been heightened by advertisements and even an e-course of high quality will be construed as average. The student did not receive what he was promised in the advertising materials.

e. GAP 5. The difference between the expected and perceived service.

The size of this gap influences the client's assessment of the delivered service quality. Although the gap depends on the client's needs and expectations, it is also connected with previously mentioned gaps related to the organization inside. Gap 5 is the function of the other four gaps (Van Dyke, Prybutok, Kappelman 1999):

$$\text{Gap 5} = f(\text{Gap 1}, \text{Gap 2}, \text{Gap 3}, \text{Gap 4}) \qquad (2)$$

In case of e-learning, the gap size seems particularly important as it influences the way in which the student perceives e-education. An e-course in which he participates is the final effect of many actions (organizational, marketing, methodological, etc) which he does not have to know, but which affect the product he receives. Thus the gap analysis might provide information about what should be changed to improve the service quality.

4. THE SERVQUAL METHOD – ADVANTAGES AND DISADVANTAGES

SERVQUAL offers a wide range of applications, e.g. to assess bank services, insurance services, library services, hotel services etc. The present paper discusses its application in e-education.

The growing interest in SERVQUAL is determined by its advantages. The most important are:

- opportunity to assess service quality provided to internal or external client,
- various grading criteria can be selected,
- opportunity to monitor the level of service quality in time (e.g. to observe to what extend service quality changes after corrective actions have been implemented),

- benchmarking (comparison of results concerning various service providers),
- simplicity (two surveys),
- simple mathematical apparatus,
- although the client's assessment is by no means subjective, the more respondents, the better chance to obtain objective assessment.

As any suggested solution to a problem, the SERVQUAL method has provoked criticism and certain reservations have been voiced. The most common are:

- the survey statements may have a different meaning to the respondents and therefore can be interpreted in various ways,
- it may be difficult for the client to specify the difference between expected and provided quality service,
- some criteria depend too much on one another,
- the method does not examine the service quality itself but the client's satisfaction resulting from the provided service,
- the survey structure may influence the client's conception of the potential service.

A detailed review of reservations about the SERVQUAL method, voiced by different authors, has been described by van Dyke (van Dyke 1999). While applying the method, all critical comments should be taken into account. Furthermore, to fully take advantage of the method, each institution ought to adjust it to its own conditions.

CONCLUSION

The quality of services provided by higher education institutions, including distance learning, gains more and more significance. It becomes one of the measures of their market position and universities face the challenge of meeting their clients' expectations. SERVQUAL is a tool which may assist in making decisions about provided service quality from the client's point of view. Thanks to its multi dimensions, the method might come particularly useful for measuring e-education quality as it can combine system approach (approach to distance learning in the context of the whole university) with the

client's beliefs and preferences. It also enables us to monitor service quality improvement in specific time and specific areas of e-education.

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POSSIBLE E-LEARNING USAGE IN PROGRAMMING TEACHING

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Abstract: *The knowledge of the algorithms basics and programming basics should be the so-called core knowledge of a student at technically oriented faculty. The algorithmic thinking can be considered as a key competence and a necessary basis for successful study not only technical oriented branches. The author assumes that especially mathematics and programming enable to acquire a very important basis of needed thinking processes. The cooperation among supervisors of these subjects can bring a positive synergistic effect in education in general. The goal of the paper is to describe the possible place for e-learning in the teaching of the programming basics. Some conclusions are offered for discussion.*

Keywords: algorithmic thinking, mathematics, programming, e-learning, education.

INTRODUCTION

Each human being is an individuality but it seems that according to his/her DNA constellation, previous type of education, social community and environment, two significant approaches to the problem solving can be recognized:

- database (memory based) approach;
- creative approach.

The first one is often used by persons who have a very good memory and their previous education corresponds to the social sciences. The second one is often used by persons who have the capability of a good analytical thinking and they like to infer from some set of base stones, conditions and logical rules.

Next text is based on the author's experience gained at the University of Defence (UoD), Brno, Czech Republic and deals with the programming education importance and the possibilities of e-learning usage in this field of education.

1. ALGORITHMIC THINKING AS A KEY COMPETENCE

Contemporary society is often called an information society. It is a technically oriented society and it requires people with so-called algorithmic thinking skill. The algorithmic thinking is considered a key competence.

The author has got the experience that the knowledge of the secondary school mathematics got worse in the Czech Republic in recent years. The same tendency can be seen in computer programming. The students' practical skills in computer usage are generally good but the knowledge of programming is often very weak. Only one fifth of new students of the UoD have some knowledge of programming.

The most of the students have no experience in programming from the secondary school. It seems that the time when almost every new military university student has known programming language possibilities and statements never comes again. This situation requires searching the suitable adequate approaches and methods of teaching.

Algorithmic thinking should be developed not only at universities but also at primary and secondary schools. The main tools for it could be especially mathematics and programming. A good deal of attention should be paid for students' competitions organized by the supervisors of these subjects or faculties (Hrubý 2008). Students' competitions or conferences on mathematics and programming can positively motivated students for deeper insight into the problems.

The process requires prepared teachers not only for teaching these subjects but also for discussion, relevant information collection, evaluation, interpretation and enforcement of proper steps forward.

2. PROGRAMMING TEACHING AND E-LEARNING POSSIBLE USAGE

2.1 Suitable Starting Point – Questionnaire Research

The questionnaire surveys have given some data relevant to the choice of appropriate teaching methods usage. The past experience is that the most important questions are the questions oriented on:

- the type of the finished secondary school;
- next studies after the secondary school;
- the current access to a computer;
- the previous knowledge of information technology (IT) from the secondary school and from the possible next studies after that secondary school;
- personal relationship to the programming;
- self-assessment of his/her own current IT knowledge oriented on programming.

2.2 Subject Study Plan Discussion

The programming basics for non-IT oriented study branches are always valuable (Hrubý 2009). It is suitable to select programming language with no difficult integrated development environment (IDE). Firstly, the students should fully accept the selected set of terms and well understand possible connections among them. Then, this core knowledge should serve as a base stone for the required algorithmic thinking. The top-down approach to the problem solving (step by step refinement) can be a key problem of the task.

Some students who feel not comfortable in mathematics can have problems also in programming. They afraid of this topic and the ‘nightmare event’ can occur. In case of this situation, the teacher should solve it sensitively and individually. The self-confidence of those students should be rebuilt with the teacher’s help purposefully. It should be done step by step.

Care about maintaining good communication on subject study plan and study results among all teachers and students is necessary. Only the quality feedback enables subject supervisor to make proper modifications related to the subject teaching.

2.3 Experience Gained at the UoD

The interesting experience gained at the UoD in Brno in recent years is as follows:

- Students of non-IT branches can acquire the basics of programming without previous knowledge from secondary schools but in some cases it can be on the line of their possibilities.
- Some talented students can be discovered during the teaching process but in some cases some of those students need more time available for much better study results.
- One of the key prerequisite for the success is an unbroken study process during bounded time.
- It seems that it is not possible to accomplish the required outcomes in limited time for every individual student.

Experience from the UoD says that MS Visual Basic can be successfully used as the first programming language. Students' knowledge from the mathematics can serve as a base stones for examples from the programming. Students can solve such problems in programming language as operations with vectors and matrix operations. A lot of inspiration can be obtained for instance from the books written by U.S. authors Halvorson and Petroutsos (Halvorson 1999), (Petroutsos 1999).

One of the most interesting challenges for students is:

- database creation in MS Access – the topic of the database should be selected according to the individual students' choice;
- implementation of the interface between Visual Basic and the database;
- implementing interventions to the database from Visual Basic.

2.4 E-learning Usage

Firstly, the contemporary university students need a general introduction into data types, algorithms searching and expressing, and finally, a review of useful commands without their specific implementations in various programming languages. Then, blocks of code as an example of simple tasks solution can be a very useful supporting tool for selected programming language learning.

All mentioned above can be supported by e-learning. The complex e-learning courses can be used but a very effective can be an approach with e-learning

usage for selected topics. This way used e-learning brings its power on the most suitable topics only.

It is not possible to forget that the place for e-learning can differ on various faculties and study branches.

The recommended components of e-learning in the programming can be specified as follows:

- early electronic syllabus of lectures;
- sharing electronic sources;
- electronic basic mandatory literature and recommended additional sources;
- audio (video) records of lectures;
- collections of students' works with remarks of teachers.

Future possible problems connected with e-learning massive usage can be expected in following directions:

- information stress (from a teaching book to hidden sources of various quality);
- eyestrain (new types of display can cause their users unexpected health problem);
- insufficient knowledge of proper well-timed rehabilitation (backbone, arms, hands) – precaution of wrong sitting position, computer mouse users problem with upper limb, etc. (Hrubý, Korytárová, 2008);
- study privacy requirements and possible abuse of personal data collected by the learning management systems (Coufalíková, Hrubý, 2010).

CONCLUSION

Human being cannot keep up with contemporary computer from the point of view of memory capabilities and searching required information stored in distributed networks. That is the reason why human creative logical thinking should be developed.

Both mathematics and programming give the students capabilities for creative logical approach to the life problems solving. Underestimation of the mathematics and the programming for future successful studies and work can be dangerous.

The way of aiming the human thinking needs time enough and this needed time interval differs for individual students. The usage of an individual approach for specific students is often suitable. The qualified use of e-learning can help students and also their teachers to achieve the objectives.

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INFOGRAPHICS – THE CARRIER OF EDUCATIONAL CONTENT

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Abstract*: Enormity of information available nowadays force to undertake some action which lead to organize and systemize the information environment. From the educational process' point of view, and in this: updating knowledge, modernization and adaptation the teaching and learning methods to the nowadays information users' needs, the necessity to use visual methods appears. At present, the cognitive activities demand the ability to smooth functioning in the sphere of the image culture and using visual knowledge. Infographics are the effective forms of presenting and recording information for educational purpose. They are the graphic representation of data, information and knowledge, they also show the complex problems in the quick and clear way.*

Keywords: infographics, visual educational materials, visual knowledge, visual perception.

I. INFOGRAPHICS AS THE CONTEMPORARY FORM OF PRESENTING KNOWLEDGE

Modern civilisation and the information society demand modern forms of recording and presenting. The amount of produced, processed, and absorbed data has gained such size that its registration and perception may be a

problem for the average recipient. Sight is the sense that most helps us to receive signals from the surrounding world, and because of this, the advantages of using graphic forms are revealed in the case of transmitting large amounts of content. It is especially visible in the case of the Internet, where we observe the important and useful roles played by graphics and images. The structure of creating an attractive website is based on the graphic composition of individual elements, such as colour, size, relationships, and directions. Information architecture, which is developing very dynamically, is focused on a system that organises the content and shows the relationships between elements, all of which all helps the users to get to specific information easily. It also incorporates elements of graphic design that adds additional meaning to the information.

One form of visual recording of information, which is gaining more and more popularity, is information graphics, or *infographics*. It is understood as 'explanatory graphics', and is focused on information, the graphic explanation of information, and transmitting ideas and concepts through images (Burns and Bitner 2011). Infographics also helps to understand or discover something easily – it is a visual interpretation. Moreover, it operates with graphic forms; however, if necessary, an infographic is also able to integrate words and pictures seamlessly and dynamically. The characteristic feature of an infographic is its commonly understood conceptual thinking. In addition to this, an infographic is an individual unit of knowledge, intuitive in perception, and directed towards holistic analysis (Grey 2011). Infographics give data and graphic information a sense in form that corresponds with presenting content. Most of all, the task of the graphic form of transmission and images used in an infographic brings additional cognitive value, which facilities perception and perceived relationships between particular groups of content, thus replacing a long and complicated word description. The good infographic connects a variety of facts and data that demand proper correlation. It is vital to find ways of graphic presentation that fulfil the requirements for good and professionally protected information as well. An infographic, in a clear and understandable way, should tell a story. It is also effective in content forms that connect within them huge amounts of data, facts, and information from different subject groups. The factor that supports the reading of a complex infographic is the interactive form that allows for in-depth exploration and multi-level analysis. In reception, the visual presentation of data should be intuitive for sight and equally transparent for the other senses; a glance ought to be enough to understand the composition's directions and aims. The means of perception and reading while following the image's elements depend on sensory perception, which is a response to

external signals. The natural human desire to discover causes that; the composition – interesting from the esthetical point of view – motivates our minds to cognition. Sensory perception is the first stage of perception – recognition of the representational structure. The next step is capturing the sense of structure, detection, and understanding the difference between perceived things and objects in the context of our visual knowledge (Pulak and Wieczorek-Tomaszewska 2010).

Preparing an infographic based on a picture, drawing, graphic and scheme representation is vital. The well-constructed infographic creates multifaceted data, which is much easier to show and understand than if they were presented in any other way.

The typology of visual forms proposed by Ralph Lengler and Martin J. Eppler in "A Periodic Table of Visualisation Methods" distinguishes six main groups among those visual methods (Lengler and Eppler 2011):

First category: Data Visualisation – "visual representation of quantitative data in schematic form (either with or without axes)";

Second: Information Visualization – "the use of interactive visual representations of data to amplify cognition. This means that the data is transformed into images and it is mapped to screen space. The image can be changed by users as they proceed to working with it";

Third: Concept Visualization – "methods to elaborate (mostly) qualitative concepts, ideas, plans, and analyses";

Fourth: Strategy Visualization – "the systematic use of complementary visual representations in the analyses, development, formulation, communication, and implementation of strategies in organizations";

Fifth: Metaphor Visualization – "visual metaphors position information graphically to organize and structure information. They also convey insights about the represented information through the key characteristics of the metaphor that is employed";

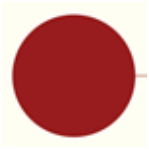
Sixth: Compound Visualization – "the complementary use of different graphic representation formats in a single schema or frame".

An infographic functions in all the aforementioned categories. In its simplest form, it may present statistical data (for example, charts), take the form of an uncomplicated graphic structure, but it could also be a wonderful medium, which explains ideas, analysis, organisation charts, plans, and conceptions.

Nowadays, the diversity of infographic forms is enormous; how to best present the problem depends on an author's creativity. The typical use of an infographic usually includes an interesting visual presentation of statistical data or illustrates physical, social, or economic processes. However, unconventional representations (such as mental maps, mind maps, decision trees, and other presentations which help to make decisions or find consensus) are more and more popular.

Visual information modelling serves as a navigation tool for complex information. It also allows regularity to be found in perceived systems of forms which show the variability of the world in the images' sets of empirical, statistical, and scientific data. The program of modern estheticisation of information is sometimes referred to as the visual revolution. According to David McCandless, the previous concepts of beauty, form, and harmony find communication use in the transmission of content that describes contemporary reality, not only that which may be defined by the image, but also that which may enter the range of disciplines of knowledge such as science, social science, and statistics (McCandless 2010). The information may be beautiful in form, but above all else, its esthetical interaction should cause better assimilation of the visual content. Beauty ought to be reflected in perfect infographic composition, as well as the truth of the content it transmits. As the axiological value connected with the theory of esthetics, truth, and good, beauty is expressed in the harmony of colours, sounds, appropriateness, balance, and usability (Tatarkiewicz 2011). This traditional definition of beauty, which dates back to the ancient Platonic and Aristotelian concepts of human beings and ideas, is nowadays verified and extended by new accents, especially concerning expression. The functional application of the concept of beauty in an infographic relies on influencing the recipient in such a way that the transmitted contents become clear, understandable, comprehensible, cause plenty of associations, illustrate the contextual analysis of the content, facilitate the construction of hypotheses and conclusions, as well as allow for the creation of theories. The mass use of infographics refers to common knowledge about the world and, just as with the *Biblia pauperum* ("Paupers' Bible") in the Middle Ages, information graphics cause sensory emotions through contemporary, sophisticated, and digital forms supported by technologies. The content placed in infographics is the contemporary text of culture with a larger or smaller scale of specialization. They represent a compendium of knowledge of contextual references, and each time transform in relation to variable interpretive perspectives.

An infographic, specifically crafted in terms of its formal and visual aspects, and oriented to hypertext and abstract thinking, has become a medium adequate to the challenges of modernity. An infographic uses data and information as a basis for the components of the problematic and contextual graphic expression, which is rich in interactive, hypermedia, spatial, and virtual character. Building functional and multidimensional presentations is done via Web-based applications and graphic and presentation software such as PowerPoint, Excel, Prezi, Photoshop, and others that use spatial, colour, composition, simulation, and sound elements. Professional artists use psychological methods of testing visual perception when they create an infographic. They also channel the construction of images towards recipients' needs. The involvement of professional artists in the process of creating infographics, as well as the problematic social reception of data, results in projects containing beautiful, visual elements, meaningful information and facts, which remain in relational and contextual interaction. These visual elements are sensually perceived and successfully remembered because of they volitive character. The ability to observe them is a source of pleasure and specific individual experience that enhances the perception of contents. It is a way of sharing information – significant, interesting, and beautiful with minimal use of a text – that guarantees the recipient's understanding. A good example is information shared on the website <http://www.informationisbeautiful.net/>, where we are able to find a unique visualization of contemporary reality, colour illustrations, and extensive colour maps and charts (McCandless 2010). The assumption of designers who work with David McCandless is that a new way of recording information will discover the beauty contained in form of communication; it will also induce free association during interpretaion and provide the recipient with complete information (Figure 1).



VISUALISING THE GUARDIAN DATABLOG

UPDATES ARE BEAUTIFUL NO.1

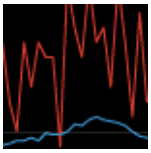
CAN DRUGS MAKE YOU HAPPY?

HIGH SOCIETY

PLANES OR VOLCANO?

KYOTO: WHO'S ON TARGET?

WHEN SEA LEVELS ATTACK



THE CLIMATE DENIERS VS THE CONSENSUS

IN DEEP WATER: CAN WE AFFORD TO SPILL ANY OIL?

BECAUSE EVERY COUNTRY IS THE BEST AT SOMETHING

HOW SAFE IS THE HPV VACCINE?

WHAT DOES CHINA CENSOR ONLINE?

THE BILLION DOLLAR GRAM

COGNITIVE SURPLUS VISUALIZED

UK POLITICAL PARTIES: DO THEY CUT IT?

SNAKEOIL?

SWINE FLU LATEST: VISUALIZED!

TIME TRAVEL IN POPULAR FILM AND TV

THE HIERARCHY OF DIGITAL DISTRACTIONS

THE UK TAX GAP VISUALIZED

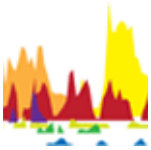

LA INFORMACIÓN ES BELLA


REDUCE YOUR ODDS OF DYING IN A PLANE CRASH


THE SUNSCREEN SMOKESCREEN


GREAT VISUALIZERS: STEFANIE POSAVEC


A BETTER LIFE INDEX


A DECADE OF FEAR


DRUGS WORLD


WE'RE HIRING!

Figure 1. Examples of graphic forms that illustrate information
Source: http://www.informationisbeautiful.net/visualizations/

The transformation of data visualization into the form of an infographic structure starts a non-traditional way of understanding; what is more, it generates new kinds of information. As we look closer, we are able to discover the details; as we look more broadly we are able to discover regularity occurring between the elements. Because of this, we are forced to see in analytical and problematic ways as well, both of which are based on increased attention and visual perception. This phenomenon is part of the current situation of the domination of visual communication (the invasion of images), which has been caused by the dissemination of communication and information techniques that use images.

2. THE USE OF INFOGRAPHICS IN EDUCATIONAL PRACTICE

The modern form of the infographic is an element of the contemporary communication and information environment. Many publishers and authors use visual text elaboration as the proper communication channel to meet the needs and habits of the receivers who are shaped by the digital media. This phenomenon is especially seen on the Internet, which is simultaneously building the contemporary educational environment.

The didactic potential of the iconographic is rooted in its form of communication that conveys the information while being at the same time a separate entity. In didactic practice, the infographic is the supplement of the learning process; what is more, it is used in such fields as social science, history, demographics, and economics.

The vital educational advantage of the infographic is the fact that in its own structure, an infographic contains all the information, including the methodical conception of the problem, which releases teacher from this obligation. Because of this, it may function independently and it may be activated at different times in the didactic process (for example, the explanation and evaluation stages). Infographics may be integrated into the educational process in two ways. In didactic practice they are found most often as completed components used in proper educational situations. In this regard, Internet resources (those also open) might become back-up facilities for education. They are prepared in a way that could be proper for students and teachers of specific subjects, and what is more, websites that are devoted to infographics' projects. Unfortunately, in Poland it is a branch of knowledge that is still developing and because of that, it seldom happens that educational websites have interesting and complex offers suited to teaching programs. However, interest in visual forms of recording information is apparent; we predict that in the meantime, like in other countries, such infographics data will appear.

The second way of using infographics is to create graphic group projects (with a teacher's assistance). An infographic becomes a tool in students' hands, helping to analyze a problem, unravel analytic thinking skills, and additionally, discover new information technology skills. Nowadays, teachers see the attractive form and advantages of infographics – there are more and more examples of using it, such as posters, illustrations, information tables, and mind maps. Academic teachers also use this tool; they appreciate its cognitive possibilities and educational value. Not only are numbers and statistical data worth presenting in infographic form. Teachers are also able to use those forms to engage students during the group work, where students analyse a problem, find connections, and see the relationships that are inside.

Interesting examples of visual action are found in didactic classes taking place at universities in the U.S., where teachers use forms of infographics more and more often to recode non-informational content, such as literature. Using the Photoshop program in their projects, students focus on showing relationships between non-statistical literature content. At the University of Texas at Austin, a program called "Visual Rhetoric" contains media, film,

culture studies, journalism, bibliography, text analysis, photography, advertisement, and public presentation. It is also used for developing research and didactic tools, which are based on connecting images with text. Students obtain an assignment, for example, in the form of the following instruction (Coleman 2011):

> "Your infographic should represent the argument and basic content of your essay, depict visual linkages between different types of ideas (…) (formal, historical, and cultural), and include at least four related images and an accompanying works cited page in a Word document - your works cited need not be a part of your infographic."

American experiences in the field of the educational use of visual forms are moving to European ground (Poland as well), where graphic designers and teachers are interested in it. There have also seen the signals of the coming visual boom, which will have an important influence on the whole educational process. The necessary condition for the development of visual forms and their proper reception is the knowledge and visual competence learned during educational and socializing activities.

2.1. Infographics in own research

The research conducted by the authors among young adults aimed at determining the level of contemporary visual knowledge. The study tested the reception of visual transmissions, asked about expererience with infographics, and checked the ability of young people to create visual messages. Visual competence in this matter, which is necessary for functioning in an information society, guarantees proper reception and the creation of media communication.

To ascertain how forms of recorded graphic information, especially infographics, are perceived in the educational sphere, the authors carried out exploratory research of the students' environments. Using quantitative and qualitative analysis, the knowledge of the term "infographics" and the way it is used in the didactic process, was verified. The survey research concerned the level of use of infographics forms in obtaining information and education, which is widely understood. The research took place in spring 2011. The surveyed population consisted of 154 students of the Departments of Philology and Pedagogy at the Pedagogical University in Krakow.

2.1.1. Understanding the term "infographic"

The survey checked the level of knowledge among respondents concerning the term "infographics" and the ability to correct identify it. The results show

that respondents identified the term "usable graphic" with the term "infographics". Too broad an understanding of the word "infographic" is the result of a lack of knowledge concerning the term. For a large group of students (about 30%), it was their first contact with this term, despite the fact that they correctly identified elements of the infographic construction on the examples.

2.1.2. Sources of infographics in education

According to the students, traditional course books and other educational materials are the categories that meet with other simple forms of presenting infographic information (Figure 2). Educational boards that hang in school classrooms play this role. However, few of respondents (26%) chose the teacher as the person who uses infographics in his or her work. This may be a sign of the lack of a teaching staff's visual competence. Visual competences are vital psycho-pedagogical skills, and are essential at the present. The results of the research show that using infographics during classes is not that popular. Nevertheless, the Internet is a popular way of expressing infographic content (51%). The detailed data obtained in the study is presented in Figure 2.

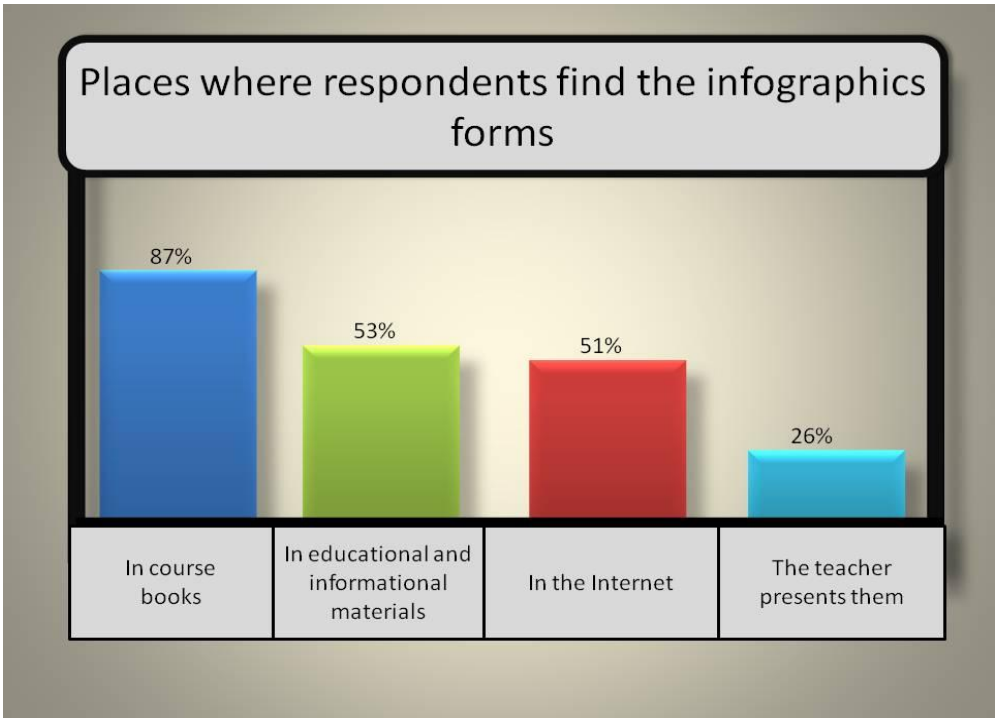


Figure 2. Places where respondents find infographic forms
Source: own research.

2.1.3. Recognition of infographic forms

Many of the respondents intuitively and correctly recognise infographic forms from among all the perceived visual forms in everyday life. The following are students' descriptions of those infographics that got placed in their memory:

"The graphic plans of tram lines, which I had to study very carefully during my arrival in Cracow, or the map of the London Tube".

"The graphic timetable – it helps me to organise my studies".

"The infographic created by my faculty students for the children's contest organised by the library. It was colourful, and the letters were highlighted and bolded. There were also plenty of pictures that drew my attention".

"A brochure of the Cracow School of Art and Fashion Design. It had an interesting graphic design: black background and neon pictures. The headline was located in the middle of the brochure with large, blue, and very bright capital letters. Everything was readable and easy to understand".

"Charts concerning information about bulimia".

"Instructions for shelving assembly".

"That infographic was not long (10 slides) and in the form of a multimedia presentation. It presented information not only using text, but also plenty of symbols and graphic references to reality".

"It was a really interesting presentation, however, a short one. It contained much detailed information describing it in an easy-to-understand way".

"A multimedia presentation, which contained a lot of symbols, detailed information and, in addition, it was colourful and clear".

"The periodic table of chemical elements set in the chemistry textbook. Illustration was concise and very colourful and because of that, the information was easy to remember".

"The divergence of Peruvian parabolic dunes on the basis of the erosion of the desert's structure".

"Infographics in the museum beneath Krakow's Market Square. In my opinion, it is very transparent, shown on the screen. There are also short descriptions of points of interests for visitors and tourists".

"Comparison of two football players: Messi and Ronaldo".

“Survey data concerning politics (bar graphs concerning the support of the political party)”.

“An infographic that shows 15 facts about marihuana – for example, why are we hungry after smoking, what was cannabis originally used for, and how the legal status of cannabis looks like in different countries”.

“The map of Poland with selected regions indicating the percentage of unemployment in different regions”.

“The map of the landscape in the Internet, distribution of cities and villages. From important to less important ones”.

“A poster with information about the victims of human rights violations. There was a chart which shows that every year, this number continues to grow. It also shows how many children (percentage) are the victims of human rights violations (those numbers are also increasing). The graphics on the poster was very well matched with the topic (a little child suffering from starvation and prison bars as well, etc.)”.

“A full-sized city map or the fragments (Cracow city centre), which are located in frequently visited places with marked monuments, vital places and ‘you are here’ spots”.

“Posters concerning abortion, which show the photos of foetuses after surgery confronted with foetuses in a womb (very controversial, too blunt, however, thanks to that, it forces one to think over the problem of abortion)”.

“Charts, which I use when I have to prepare for classes, for instance those which show percentage charts with some information”.

“The presentation of a map of stars in the astronomical centre”.

“I am fond of graffiti located in the area of the Krakus Mound. It shows the whole history of Poland – since the time when Piasts were living to the times of Pope John Paul II”.

“Graphical representation of large and small blood circulation, where veins and arteries are highlighted in different colours. Everything was nicely and clearly described and because of that, there was little difficulty with understanding”.

“The multimedia presentation shown by the teacher during class – it contained many symbols, detailed information, it was incredibly colourful and clear”.

Among those descriptions, information posters designed as infographics are mentioned repeatedly. Additionally, large, distinct letters, good graphic layout, the use of pictures and images, non-confluent colours are stressed as valuable for an informational poster. All those elements influence the clarity of communication. We quote below some elected statements regarding to this category:

"The most memorable infographic for me was the poster hung on the wall of the classroom, which showed a diagram of the structure of speech organs".

"Schemas of the fire escape routes from the school building".

"The process of element circulation in the environment (picture with captions and arrows)".

"Family tree in mythology".

"Boards in the biology classrooms".

"A poster of human anatomy".

The obtained data confirms the fact that didactic materials, such as pictures, illustrations, boards and schemas, which have been in use for many years, play an important cognitive role to this day. Today, this underestimated element of school space design is appreciated and may be successfully used in new, digital forms as an infographic. Moreover, it is also complementary to the virtual educational environment. It may be especially important in the case of e-learning, where the physical frames of educational space do not exist.

Mind maps are the creative form of graphical statements, which organize and systematize information established during educational activities. For years, this method has found its place in the learning process of teaching. Nowadays, the traditional form of a mind map provides the basis for creating more advanced visual structures by using new technologies. Respondents repeatedly emphasized the usefulness and appropriateness of its application in their own statements:

"The mind map prepared in order to discuss the violence problem among young people was colourful, very clear, and contained lots of essential information".

"The mind map concerning self-education".

"The mind map prepared in the form of notes in order to better assimilate the knowledge".

Thinking over the infographic form of information, respondents took notice of the role played by composition, colour, and graphics in organizing and systematizing data which is placed on the Internet and because of this, that data is more accessible and understandable, for example, "allocation of information on the webpage: <www.Onet.pl>".

Characteristic of the generation of "digital natives" might be the music video, available on the Internet, that contains many different infographics that create the background for the electronic song entitled 'Remind Me' performed by Röyksopp:

"Infographics which are contained in the music video 'Remind me' (directed by Ludovic Houplan & Hervé de Crécy, MTV, Europe Music Award for best music video 2002, http://vimeo.com/2285902).

2.1.4. Functions of infographics

In the survey, the purpose of using the infographic to record content in relation to cognitive processes was also analyzed. Students find graphical forms very helpful – they make the process of understanding and remembering easier. According to respondents, infographics support imagination, foster creative thinking, and help in organizing knowledge schemas. The research shows that students recognize the potential of visual information. The obtained data that illustrate percentage of answers on particular questions are shown in Figure 3.

The infographics	Definitely yes	Rather yes	I do not know	No
Smooth the progress of understanding	51%	47%	1%	1%
Make remembering easier	61%	33%	5%	0%
Help in creative thinking	37%	45%	16%	2%
Assist imagination	52%	40%	6%	1%
Help to create knowledge schemas	30%	49%	19%	2%

Figure 3. Functions (advantages) of infographics according to respondents.

Source: own research

2.1.5. The graphical elements in designing own educational materials

The tools and components used during the learning and teaching process in order to prepare notes in graphical or text form illustrate respondents' characteristic habits and preferences. Students usually operate on text using the accurate graphic form. They highlight, bold or colour with marker the important information. In addition, they use symbols and signs in their notes, and because of this, the notes may take the form of pictures, schema, tables, or charts. Respondents' answers (in percentage) are presented in Figure 4.

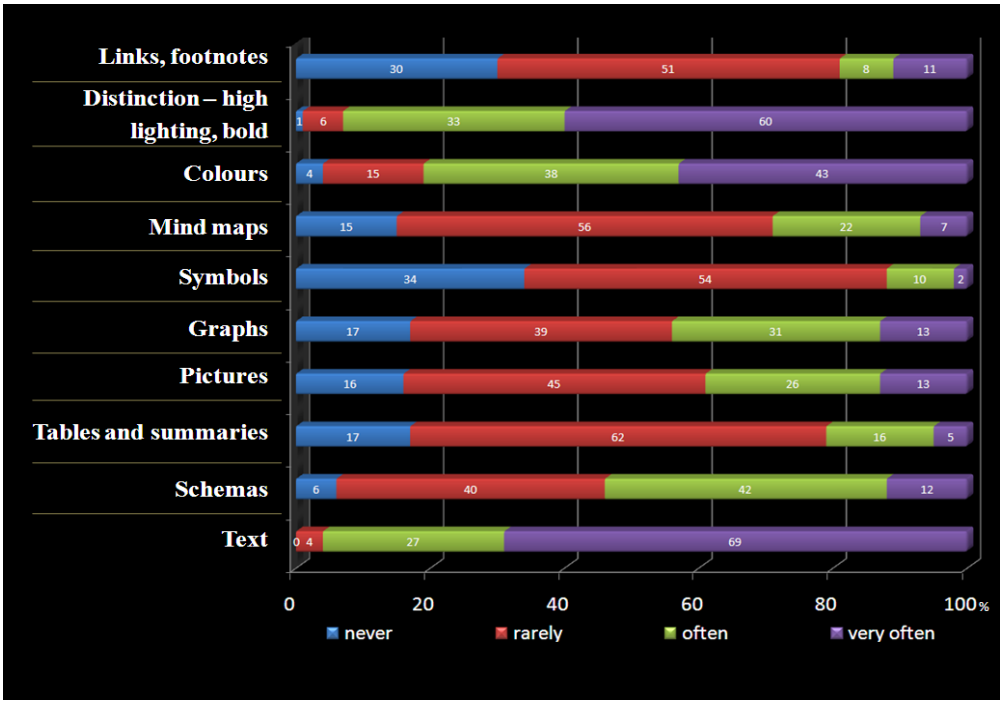


Figure 4. Graphic elements in respondents' own notes
Source: own research.

In materials prepared by students, the use of a structure of links and references were visible in the form of arrows, footnotes, and comments. They improve their notes by highlighting relations and connections between components.

2.1.6. Mind maps as a form of notes

As it was mentioned before, the mind map is most similar to the infographic form when presenting information, which makes for increased learning efficiency by encouraging the recipient to remember illustrations of relationships. Mind maps have enormous educational potential, which is not

always met in the didactic process as fully as it should be. At present, mind maps, and the IT tools that provide mind maps with the multimedia and interactive layers, may be the main elements of educational methods. Some respondents (24%) claim to use mind maps as the visual form of content record. They also stress that they use keywords to emphasise the most important content.

Designing contains the use of graphic distinctions, such as choosing the size and style of letters, which may be also emphasized by varied colours. In a compositional system, the mind map uses a hierarchical structure that takes into consideration the relationships between elements. In the Figure 5, the detailed respondents' answers are presented.

Students usually prepare notes in the form of mind maps – traditionally on a piece of paper. The electronic form of mind map is seldom used: some respondents (10%) use a Web application, and 3% of respondents use computer programs, such as FreeMind. Preparation standards for teachers highlight the use of advanced technology tools, which may be used to produce educational materials. The procedure of mind map construction is a constant element of the educational process because it carries huge cognitive, methodical, and emotional potential (integration and cooperation). Additionally, stimulating creativity may be the positive effect because nowadays, it is an incredibly vital attribute.

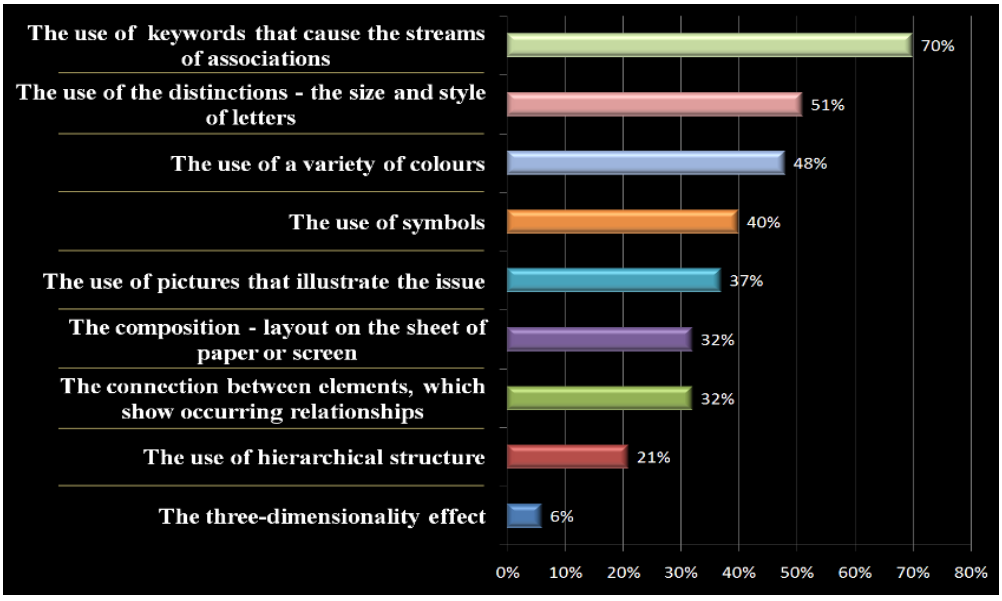


Figure 5. Structural elements used to create graphical information.
Source: own research.

3. DESIGNING INFOGRAPHIC FOR EDUCATION

The needs of contemporary education are connected with the level of visual knowledge, which is in the possession of information receivers. The increasing value of images in many spheres of life are linked with the development of visual information methods and technologies. The result is the appearance of a large amount of pictorial representations, present in everyday life. In the case of the teaching process, visualisation should be partially formalized, based on clear, explicit rules; moreover, it should bear in mind the cognitive processes occurring in the human mind (for instance, adjusted for a student's age and cognitive maturity). The process of image perception and the multistage analysis of content substance are conditioned by individual predispositions shaped through socialization and education. In an intuitive reading of contemporary infographics, receivers' experiences have great importance. The difficulties with didactics and methodology in particular subjects is not the acceptance of visual presentation of the educational material, because it has been happening in schools for years, but the difficulty exist in the elaboration of the modern form of infographics, which should depend on the teaching program. One of the programs initiated and conducted in the U.S., "Teaching with Infographics", is worth noting. It is operated by the *New York Times* editorial team, and includes a whole spectrum of issues related to visualization of knowledge. It is also an Internet resource database for teachers looking for current visual didactic materials. As the part of the "Learning Network *New York Times*" program, teachers and students may use the shared materials, especially the updated and authorized contents. Moreover, they may take part in all the educational projects carried out by the editors (sample programs: "Opinion Question", "Word of the Day", "Test Yourself Questions", "News Quizzes", "Fill-In", "Poetry Pairings") (*The learning network...*, 2010). In 2010, the *New York Times* offered interactive workshops in reading and interoperational visual information. It was dedicated to students and teachers and functioned as sharing the best infographic projects in areas such as history, geography, politics, sociology, economy, knowledge of society, literature and art, medicine, journalism, media studies, and 'edutainment'. The program also included issues of visual information organised by category of school lesson topics that contained current examples ready to use during science and culture lessons.

Additional interesting teaching propositions in modern education concerning infographics are mentioned in the Internet magazine *SpyreStudios* (http://spyrestudios.com). In the article "The Anatomy of an Infographic: 5 Steps to Create a Powerful Visual", Sneh Roy describes the process of

creating infographics (Sneh Roy 2011). This anatomy of an infographic involves a 5-stage creative process, which produces a proper project: precise and easy-to-understand in terms of conception and manner of expressions.

Designing an infographic may often be connected with actions focused on transforming previously developed statistics or an empirical or scientific database by choosing appropriate forms of visual expression. The next step is to decode topics by theme and image references, for example: icons, symbols and allegories. This kind of recoding is supported by colours; what is more, it gives meaning to the directions and interactions of structural components. This kind of composition should activate the thought process during the receiver's perception practice and after that, knowledge could increase. Infographics built according to Sneh Roy's schema contain three very important parts:

- visual – colour coding, graphics, reference icons;
- content – time frames, statistics, references;
- knowledge – facts, deductions (Sneh Roy 2011).

The *Hierarchy of Visual Understanding*, published on a website by David McCandless, shows the components of the visual knowledge necessary for the proper construction and decoding of infographics.

The first stage of preparing the infographic process is visualisation – collecting data in databases that is going to be presented in graphical form as words, numbers, calculations, codes, tables, and categories

The second stage of graphically recording information is design – transforming data into images by using proper composition and structure. The system of linked elements (sentences, paragraphs, conceptions, ideas, questions, and simple stories told through images) forms the fundamental layer of the transmission of information.

During mapping, the third stage of design, organising information into complex thematic structures (chapters, theories, complex conceptions, complex stories) takes place. The aim of this stage is to allow recipients to interpret and deconstruct the decoded information, and make individual judgments.

The last stage of correct infographic construction refers to the newly acquired knowledge: it should show the increase of knowledge obtained after discovering the content in the context of the previous cognitive experiences. This cognitive interaction is the infographic's advantage that is often highlighted. It is the result of the possibility of using epistemology and

teaching knowledge and the knowledge of modelling the cognitive process during design.

4. CONCLUSION

The foundation for infographic content is in scientific research and recent, verified knowledge. An enormous amount of infographic potential resides in the possibility of using it for education and science. The ability to read and record infographic content is inextricably linked to skills in visual knowledge. Every participant of modern culture should develop these skills in order to create and correctly decode media messages (Schnetler 2009). Acquiring visual competence is a long educational process, especially important in the case of using the e-learning method. At this point, a user works individually with separate information units, which play an essential role in e-learning methods. Examples of these content units may be infographics. The visual and complete presentation of content that is crafted according to methodical and cognitive aspects is a great tool for the distance-learning teacher. It not only supports the process of transmitting information but also can be used to foster the process of memorizing or monitoring the learning progress. The research connected with visual skills become more in more important in the context of development of the contemporary digital educational media. Visual skill should be considered, on the one hand, as the set of skills acquired during a student's learning process and, on the other hand, as a set of competences characteristic for the teacher. The set of skills comprise the ability to use infographics, ability to create them and ability to use them in educational practice.

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V. E-LEARNING FOR PEOPLE WITH LIMITED ABILITIES AND SPECIAL NEEDS. PSYCHOLOGICAL, SOCIAL, ETHICAL, CULTURAL AND LEGAL ASPECTS OF DISTANCE LEARNING

A COMMUNICATION SOFTWARE FOR USERS WITH SPECIAL NEEDS

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Abstract: *The paper describes possibilities of testing and practical implementation of the application for users with special needs for example an autistic spectrum disorders, the Down's syndrome, mental retardation and other growing defects, which cause handicapped children obstacles learning spoken natural language. The project is based on the knowledge of the communication system PECS and its Czech variant VOKS. It shows basic possibilities of using computers for education and support of communication skills. Children with specific disorders face communication difficulties and common ways are often unusable. The target user group requires a specific approach to development and testing of the created software. Thus, apart from common functional testing, quantitative and qualitative methods of pedagogical research were also used.*

Keywords: Autism, Down syndrome, qualitative and quantitative pedagogical research, VOKS.

INTRODUCTION

Use of information and communication technologies has reached massive expansion recently. Computer users are to be found in every social and

professional group. Computers simplify a lot of work tasks, make methods of communication easier and more accessible, intermediate new information, etc. These modern technologies can play a role of important supporting and compensational means for a group of users with specific needs. It is mainly people with some mental and health problems who face difficulties with communication, and common means of communication are usually unusable for them. Computers can act as a positive agent in such cases. However, hardware and software must be adjusted to the specific needs and it is not possible to implement experience gained and applied with common groups of users.

There is a potential group of users with specific disorders who could make use of the development of communication skills. E.g. people with autistic spectrum disorders, Down syndrome, forms of mental retardation and other development defects which cause problems to learn and use spoken language, written text, and other commonly used means of communication. Various methodics bringing interesting results have been worked out to develop communication skills of people with the above mentioned disorders. For instance, such methodics is the system PECS (The Picture Exchange Communication System) and its Czech variation VOKS. The base is a use of pictures representing particular concepts, things, activities. The user gradually becomes familiar with new concepts – pictures, which are then incorporated in their list. Choosing pictures and placing them on a sentence strip helps them learn to create even simple sentences (Charlop-Christy, Carpenter, Le, Leblanc, Kelley 2002)

VOKS methodology is designed for persons both with autistic spectrum disorders and with other verbal problems, or for persons whose speech has a limited dysfunction effect. What's more, it can be used with children with Down syndrome, aphasia, or serious form of dysphasia. It also proved very suitable with clients where other alternative and augmentative communication systems failed or do not fully fulfil the purpose of functional or initiative communication. The VOKS can be started with at any age, optimally immediately when it is obvious that the child has problems with common functional communication. There is no need to wait whether the speech develops or not because it does not impede speech at any way, but rather increases the probability of its development and improvement. The methodics is divided into two basic parts. The first contains important information concerning teachers of the VOKS system and training environment. In addition, it describes preparation of individual tools for communication and the way of reward choice before the whole training of the communication begins. The second part contains educative lessons, which

form the backbone of the education (Knapcová 2005). The Czech system VOKS mainly stems from the methodics and principles of PECS (The Picture Exchange Communication System) (Bondy, Frost; Charlop-Christy, Carpenter, Le, Leblanc, Kelley 2002).

Creating applications for users with specific disorders often requires a different procedure than with common applications. With respect to little experience with creating such a type of applications and unclear requirements of the submitter, agile approach to development of applications seems to be the most suitable. The VOKS application has been developed using methodology of Extreme Programming (Ambler 2006). Testing the application by its users also requires a different approach. Unlike commonly used software, there are specific problems when testing:

- The target group of users is not large enough.
- The target group of users is very diverse and the level of the disorder considerably influences ability to work with the programme.
- The phase of learning how to use the programme is very time consuming.

1. APPLICATION VOKS

The application tries to use the VOKS methodics and it contains several levels and phases of usage fully corresponding to the chosen methodics.

– Level one – the user learns to choose the picture by clicking. The desktop shows only empty fields and one picture which has been randomly chosen from a pre-defined group of pictures – concepts. The child's task is to click on the picture. The programme monitors all clicks in the empty fields and the information is saved in an XML file. During the development and verification of the application, we have found out that it is not convenient to use classical way of control and distinguish clicks by left or right button. Children with certain disorders find work with mouse itself motorically very demanding, so the button distinction was rejected. Adding sound to the picture proved to be an advantage, though. Support of other sensation makes the process of learning easier.

– Level two – the user sees two pictures. One represents positive, pleasant emotions and feelings, the other negative. The child learns to choose the picture connected with positive emotions.

– Level three – having mastered the two previous levels, the vocabulary of the users expands and individual concepts – pictures are classed in

categories, which differ in colour. The child learns to choose concepts from the categories and places the pictures onto a sentence strip.

– Level four – serves for independent communication and the users composes short sentences and sequences using concepts from different categories. At first, the sentence strip enables the child to form simple sentences such as "I want a chocolate", etc.

– Level five – increases communication level and enables to create a picture, description of events and situations.

The first three phases of programme usage primarily serve to learn how to control the programme and to get acquainted with the pictures and their content (Figure 1). It is highly important to observe activities of the user. This happens on two levels. The first is observation of the parent, tutor, or health worker who teaches the child how to use the programme. The second is built-in monitoring in the programme itself. Each activity is stored in the XML data file format. Subsequently, it is possible to retrieve information about which pictures are difficult for the user to be understood, which are not mastered so well by the users, which position on the screen is problematic to reach, etc. This information can serve not only to the tutors, but also to the creators of the programme for eventual improvements.

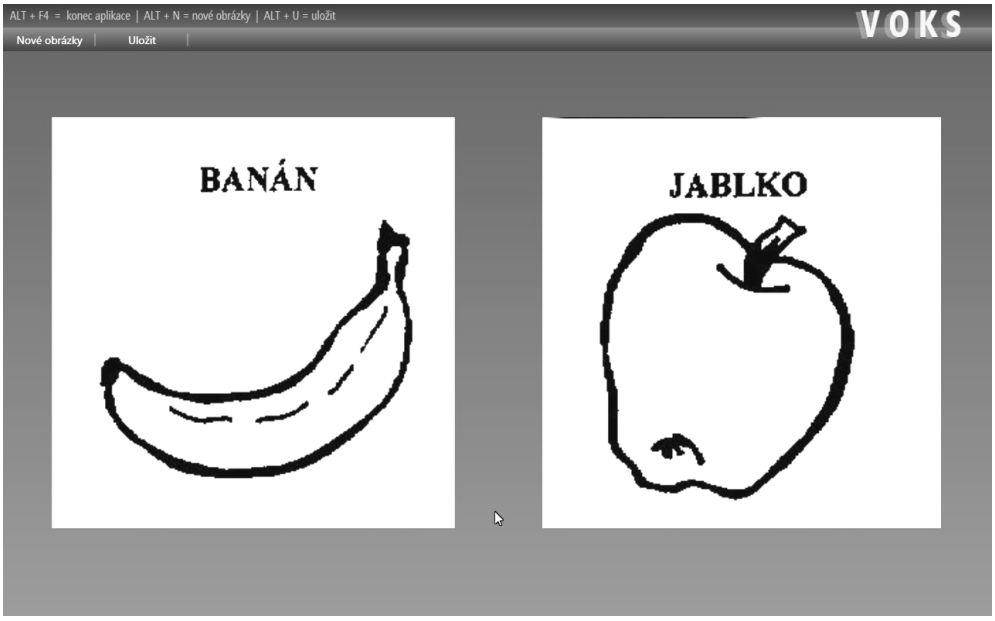

Figure 1. Interface of application VOKS

2. TESTING OF APPLICATION VOKS

The first phase of testing the VOKS program was carried out by the staff of a special school and it was not possible to present the program to users with special needs. Children could react very negatively to possible fundamental changes of graphical environment and basic functionalities. It was not until the application had been approved by the special school staff that the testing phase with children could begin (Knapcová 2005, Scherz, Meng-Ju, Broston 2006).

The quality and successfulness of the educational and communication software were performed using a four-month pedagogical research carried in a qualitative and quantitative form in three special schools which focus on education of children with special needs (Gavora 2000). Unlike common users, these children require much longer time for education and getting familiar with the application. With respect to individual differences between children with specific disorders, the objective of the research was not to recognise complex and general deductions valid for all users, but to find out how the program helps individual children.

2.1 Quantitative pedagogical research

There were 20 users, aged 5-18, selected for the pilot testing. The group included children with various specific disorders and various level of disability. Thus the approach to individual users had to be very individual respecting the various levels of health and mental disability (Hoekstra, Bartels, Cath, Boomsma 2008). Therefore the results of individual children cannot be fully compared. The age of individuals does not play as important role as their health condition.

The quantitative pedagogical research was carried out using tools which were directly implemented in the VOKS application. Every activity of a user is monitored and recorded into diagnostic files in an XML format. The primary phase of the research dealt with selection of children who do not have any fundamental motor problems. Low number of the monitored children was caused by specificity of the target group and the need of a very individual approach. In addition, the children can focus on work with the program only for very short time periods and therefore the whole process of monitoring the users is much longer.

Every user's activity was continuously recorded and the data subsequently analysed. The basic monitored values were the number of wrong clicks (selections), observing the position of pictures and types of pictures (terms) which cause problems to the children. All this data is recorded by the VOKS

program into XML files that are automatically created whenever the application starts up.

The learning phase presents the user 1 to 12 pictures in twelve positions (in two lines, each with six). The pictures are generated randomly in the positions. Having clicked on the correct picture, the picture is enlarged and an audio recording starts playing. Other pictures hide away. On the contrary, a wrong click is recorded and stored in a diagnostic file. Having completed this phase, an XML-format file is created with a name containing user's name, date and time. The file contains this information:

- Name of the picture
- Path of storing the picture
- Path of storing the audio to the picture
- Category where the picture belongs
- Frequency of using the picture
- Position in which the picture is
- If the picture is in category favourite or unpopular
- Records of wrong positions

Next phase of the learning process serves to differentiate between favourite and unpopular objects and terms. Having completed the phase of learning the terms - pictures, the children start creating simple sentences using the pictures.

2.2 Examples of acquired results

User n.2, aged 6. Child autism, moderate retardation, level of speech – difficult understanding, use of simple words, muscle hypotony. Reached VOKS level - 5th lesson in a paper version. The suer works with a standard mouse. Most wrong clicks in position n.2. Errors were frequent, the ratio of wrong clicks and the necessary number of clicks when selecting correct pictures was up to 68%.

User n.6, aged 18. Diagnosed apalic syndrome, quadruparesis, moderate mental retardation, anarthria. Level of verbal speech – low, word "yeah" in all meanings. Reached VOKS level – 6th lesson. A touch screen is used to control the program. An average error rate when selecting pictures in educational part of the program was 32%, the most frequent wrong position

was position n.2. In the differentiation phase, the user did not make any mistakes.

User n.8, aged 9. Diagnosed child celebral palsy – quadruparesis, moderate mental retardation. Level of verbal speech – taciturnity, loud laughter or cry. Reached VOKS level – 6th lesson. A touch screen or alternative mouse is used. An average error rate when selecting pictures in educational part of the program was 13%, the most frequent wrong position was position n.3. In the differentiation phase, the error rate was 2%.

The overall results reveal that the average error rate of picture selecting was 6% both in learning and differentiation phase. The acquired results can be considered excellent and it is obvious that the children accepted the program well. Concerning wrong selections – clicks, the most frequent positions of the selection occurred in the top-left part of screen.

However, the acquired results of quantitative research show that the differences between individual users are very significant. Everything depends on specific disorders that are diagnosed to the user.

2.3 Qualitative pedagogical research

With respect to a low number of users and their individual differences, the method of quantitative pedagogical research could not be used. Acquisition of other findings was also done by methods of qualitative research, primarily by unstructured observation carried out in several variants. The first variant used event samples, which are detailed records about the users and environment. The observer recorded the events as they occurred. The second used variant was terrain records where the observer chooses only certain events. The last variant was participation observation, where the observer tries to acquire a detailed knowledge of the researched reality. This observation takes a longer time, usually months, so that the observer could learn thoroughly about the observed user and environment (Savenye, Robinson 2003).

2.4 Results

The pedagogical experiment using observation method led to findings about the basic problems of the users:

- motor problems when using a mouse
- physical movement limitations
- bad coordination of movement – some disabilities cause children problems in coordinating mouse movements and following the cursor on the screen

- users' taciturnity and moodiness
- users' lack of concentration

Observing the children reveals the following conclusions:

- The children learned individual symbols faster in a software version of the VOKS than in paper one.
- Computers supported the children in their motivation. However, sometimes their captivation by the computer was so high that the children were impatient and less concentrated. It took longer time before they started to concentrate on their work with the program.
- Manipulation with a mouse caused frequent problems to children. It primarily concerned coordination of a mouse movement and observing the screen.
- Despite some children moving the cursor by the mouse to the correct position, they also tended to touch the screen where the picture was, or they had problems with clicking the mouse necessary to activate the selection.
- Using a touch screen turned out to be the best choice. Direct contact with the screen in position where the picture was reminded the children using a classical paper VOKS version. It was more natural for the children and they made fewer mistakes using a touch screen.

Next phase of the research will be carried out in more special schools. The program will be made accessible to children with more serious disorders as well.

3. TOUCH SCREEN POSSIBILITIES

In near future, the software program stemming from the VOKS methodology will not fully replace a paper book – a container with cards which the special school staff wants to use in at least the first phase of learning. The software application seems to be more convenient after completing the first lessons and primarily with children who begin to have larger vocabulary. A container with a larger number of paper cards is too heavy for most children and manipulation with it is difficult. The qualitative research showed that controlling the computer by a touch screen is the most suitable. Desktops are suitable when used at schools or user's home. However, some users with specific disorders apply the picture system in communication even outside school and home. Some of them find it as the only way of communication with their surroundings. That is the reason why desktops and notebooks are not suitable for such a purpose. The most suitable device seems to be a tablet

with a touch screen size 7“ to 10“. Its dimensions and weight around 0.5 kg are suitable even for carrying. Operating systems (iOS, Android, WebOS) optimised directly for such devices are fast enough, they offer instant reaction, long-lasting battery capacity, and real customisation for finger control. Current disadvantages are higher price and lower distribution.

CONCLUSION

Concerning the fact that the target group of users of the described software is not very large, forming a relatively small sample, it is advisable to offer it a quality solution. People with specific disorders are mostly dependent on supporting tools and means. It appears that information and communication technologies offer a way to improve their life standard. They enable to create tools which were not possible when using common approaches or they were very difficult to realize. When creating software for children with specific disorders such as autistic spectrum disorders, Down syndrome, mental retardation, etc., it is necessary to cooperate with doctors, psychologists, and health workers. It is the area of programme control where the creators of programmes must apply totally different criteria and processes than with common applications.

The computer program must have a very simple control without useless control elements, simple graphical environment, pictures and colours that correspond to the original paper version. The control elements must be big enough so that the children would not have problems with their selection and use. Children with specific problems find it most suitable to use a touch screen. Pedagogical experiments also used computers type All-in-one with a touch screen. When working with this computer, children worked better, they made fewer mistakes than when using positioning devices, such as mice. The basic disadvantage is the position of the touch screen in a vertical direction. On the other hand, the program is not used by the children for longer time periods. Optimising the control using fingers on the touch screen had to be done by customising the control elements of the program. All elements that serve to control the application by users with specific disorders had to be adjusted dimensionally so that the children would not have problems with selecting the element using a finger. The observation showed that the button to advance in a lesson was not big enough. Its size was optimal when controlling with a mouse, but children using a finger and a touch screen faced problems to press it at the first try. Buttons for browsing between pages with pictures were also enlarged as much as possible so that the children would not have problems with their selection.

Using a positioning device of type BigTrack proved to be unsatisfactory. The program requires movements of the cursor across the whole screen, which brought problems to numerous children when using this device. BigTrack proved to be suitable only when moving the cursor at a short distance.

With respect to the requirements and abilities of children with specific disorders, using a tablet platform seems to be very convenient for the VOKS program. The platform concerns a mobile device with low weight and a touch screen, which serves as the primary control element.

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THE DISABLED LEARNING A FOREIGN LANGUAGE - RESTRICTIONS AND POSSIBILITIES OF USING EDUCATIONAL PLATFORM

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Abstract: *Using distance learning courses in teaching the disabled is becoming more and more popular as it is essential to know a foreign language nowadays. Joining European Union determines apart from gaining qualifications necessary in professional life using a foreign language, and knowing a language is one of the key factors that allow the development of a career in Poland and other countries as well. The disabled taking part in distance courses can take part in them no matter what type of disability they have. It provides contact with people using a foreign language, they learn about the culture as well. The paper focuses on factors which have to be taken into consideration while preparing a course for the disabled with emphasis on troublesome issues.*

Keywords: disabled, distance learning, educational platform, foreign language.

INTRODUCTION

Special education is an integral part of the system of education in Poland. The Act on the System of Education involves 'applying contents, methods and adjusting organization of the process of education to the psycho-physical abilities of students', as well as 'the possibility of using psychological care and special forms of didactic help, and getting education in all types of schools by the disabled children and youth'. The Act obliges the Minister of National Education to specify the rules and organization of care referring to such students and their education in widely available and integration schools and institutions as well as organizing special education (http://biurose.sejm.gov.pl/teksty/i-635.htm#trzy). According to the data

provided by *Report about the Social Development of Poland 2001 – Poland on its way to global information society* (*Raport o Rozwoju Społecznym Polska 2001 - Polska w drodze do globalnego społeczeństwa informacyjnego)*, every tenth disabled person has only partial basic education, about 57% completed basic education and only 3,7% completed higher education. Te reasons for such state are different barriers such as: architectural, financial, hampered access to materials and information (http://www.unic.un.org.pl/nhdr/2001/raport.php?strona=138). The condition for improving the state of education of the disabled and enabling them entering the job market is undertaking certain steps by the government. The directions for such actions in Poland were specified in a *Charter - Rights of the Disabled* (*Karta Praw Osób Niepełnosprawnych*) adopted by the Polish parliament on 1st August 1997. The charter pays special attention to the laws of the disabled which mention education in open education and employment at the open job market and full participation in public and social life. The priority of the equality of chances is included in European Union actions. On 6th January 2003 *e-Accessibility* – improving the access of people with disabilities to the knowledge based society (2003/C 39/03) was proclaimed. The main aim of the UE strategy referring to disabilities is creating a society which involves disabled and eliminates the barriers of access to different forms of being active including education, professional training and employment (Lubina 2007). Despite the fact that virtual reality is more and more often present in the life of the disabled being part of it very often causes problems and difficulties. In 2003 a research among the disabled was conducted which aim was to point out the most common problems which are faced while using modern technologies to get information and knowledge (Ślusarczyk 2005). The aim was to identify different issues connected with the use of information technologies by the disabled. One of the problems mentioned by the participants of the research was lack of the possibilities to read PDF files by the use of software owned by the disabled. However, 42,5% said the biggest problem is lack of access or little access to many websites. The problem concerns mainly people with different visual impairments. Blind people and those who have problems with eye-sight very often have problems with working on the Internet and to be more precise with navigation on the websites because designers of websites do not follow the regulations set by World Wide Web Consortium (W3C), which describe the standards of website creation. They are not aware of the fact that the websites they create may be watched (read) by the use of devices different from standard computer screens.

1. DISTANCE LEARNING IN FOREIGN LANGUAGE TEACHING

Distance education of the disabled is for them a great chance. More and more often foreign languages are taught this way as they are a crucial part of contemporary education. Opening of European job markets determines apart from professional qualifications, knowledge of foreign languages. It can be stated that the knowledge of a foreign language is a condition for making a career both in Poland and abroad. A good knowledge of a foreign language is necessary nowadays.

Among different forms and techniques of teaching foreign languages a lot is currently said about a form of distance education which is blended learning. It is used both at universities and private language schools. Blended learning is a way of teaching that combines classes in a traditional classroom and online. It uses advantages of e-leaning and traditional education. The basic environment for blended learning is educational platform. The most popular open source tool of this type is Moodle platform – commonly used in teaching English (as it is the most popular language) and other foreign languages as well. Educational platform offers a lot of possibilities in teaching a foreign language – this system has many functionalities which allow communication and distance work with learners, creation, creating archives of electronic files of all possible formats, and managing the users. To say it differently educational platform is a virtual learning environment. Well designed classes done with the use of a platform force the learners to regularity and at the same time the raise the effectiveness of the process of teaching. The person running a distance course has the chance to manage the group of learners by sending them tasks, providing them with materials or by talks done on a Forum. Platform is a device that allows individual work, working with a group, or only with the person running the course.

1.2. Characteristics of a distance learning language course

Language course on a platform can be prepared as an e-learning or blended learning course. In case of a fully online course materials will be provided on a platform and all activities done by the learners and the teacher will be done only through the Internet. Each language course should in its structure include activities that would develop key language competences i.e. reading, writing, listening and speaking. Moreover, it should enable the development of the scope of vocabulary and the knowledge of grammar structures. In a full e-learning course we can encounter problems with practising listening and speaking skills as these require a face-to-face contact with the teacher, however, the latest versions of educational platforms offer the possibility to listen to recordings and speaking can be practised through Forum. In case of

learning a foreign language a face-to-face conversation would be advisable as it allows i.e. correcting pronunciation. A blended learning course will differ from e-learning course as part of it will be done in a traditional classroom and part of it only on a platform. During face-to-face classes learners will practice those skills that cannot be developed on a platform as they require a direct contact. Face-to-face part will thus include speaking, writing, listening activities. Online part may include quizzes (closed tasks for self-evaluation), texts prepared by authors of the course[1], tests, audio and video files. Thanks to them a learner can develop those competences that do not require a direct (synchronous) presence of the teacher (leading a language course) and the learner.

2. USING ICT FOR TEACHING DISABLED

J. Buczyńska and B. Siemieniecki distinguish the following advantages of using information technology in the education of the disabled:

- interpersonal communication with the outer world – the disabled very often are forced to stay at home, thanks to the Internet they have a virtual contact with the world – they enter discussions, get to know interesting people, share views;
- source of knowledge – access to information presented in a form of multimedia favours intellectual development; computer network offers possibilities to broaden the knowledge;
- ICT is a tool that allows improvement of qualifications and competences – computer network gives access to a number of educational materials; due to the development of information technology there are new services and new professions that can be done at home;
- therapeutic tool – these are professional programs or sets of therapeutic, educational programs that include tools for therapy or are thematically or partially connected with therapy, can be prepared for individual learners;

[1] While designing a course it should be remembered that it cannot include any materials that would violate copyrights.

– developing skills – due to the fact that by the use of a computer the activities can be repeated as many times as possible (Buczyńska J., Siemieniecki B., 2002).

The above mentioned advantages of distance learning allow to state that in the process of teaching foreign language to the disabled virtual environment gives them a chance to take part in language classes without restrictions connected with types and degrees of disability. Taking part in a language course enables having contact with a language, getting to know culture of a language area, offers contact with other people who use a language foreign to them as well. However, it is worth considering whether designing a language course for different types of the disabled will require a different attitude to the design process of the course functionalities and resources. These conditions should be certainly taken into account as at the first stage of course design (i.e. analysis) a group of learners should be specified and the materials should be prepared taking the groups needs into consideration. Having in mind different types of disabilities (physical, visual, hearing) three types of learners with specific needs can be distinguished:

2.1. Physically disabled

In case of this group a full e-learning course will certainly fulfil its role as these people very often have problems with moving around the city, and at the same time getting to a language course. Language courses can be organized in places not adjusted to the disabled. These learners can use all materials provided on a platform, a contact with the language will be possible by chatting, talking on a Forum or even using communicators or the possibilities of having a talk by video conference devices. It is worth having in mind that even with a severe degree of disability (especially upper limbs) those learners can use: special keyboards equipped with a device preventing pressing several keys at the same time or cordless keyboards with ball or key manipulator, writing devices steered by head movements, arm supporting devices etc. Such devices include IntelliKeys USB, which is a special keyboard that allows people with different impairments to use a computer. IntelliKeys has many functionalities which enable it to be used by the disabled (especially those with quadriplegic cerebral palsy), i.e. adjustable reaction time and durable keys that allow to press buttons in combination of sequences. BigKeys LX Blinklt is a device which enables to steer the computer and communicate it can be used by those who preserved the ability to control eye movements. Optoelectronic sensor observes eye movements that are illuminated in IR and changes it into a sign transmitted directly to a computer. It allows writing on a screen and steering the mouse. Additional

devices such as Mrugomysz and Mrugopis (a board with letters seen on a computer screen) enable access to the most important computer functions. BigKeys LX is a keyboard with huge keys. It is available in black and white or colourful version with ABC or QWERTY keyboard. The keys are four times bigger than in a standard keyboard, inscriptions are ten times bigger, and it can be useful for people who have problems with operating a standard keyboard as they suffer from palsy or paresis. A traditional computer mouse can be replaced by a Head Mouse. It is a small, elastic and thin as paper dot placed on the user's forehead which follows the movements of a cursor, a reader placed on a computer screen records those movements. Arm supporting devices enable comfortable work and do not limit any movements. Moveable parts allow moving hands in a vertical position. Arm support allows muscle tension reduction and limits hand, arm and neck stiffening. Moveable mouse pad can be set by any user in a position enabling a comfortable work. (http://www.harpo.com.pl/index.php?prtlid=1098&kat_id=132&art_id=257).

2.2. Partially deaf and deaf

Those learners can take part in both e-learning and blended learning courses. In their case the main function of a platform will be practising reading skills, broadening the knowledge of vocabulary and grammar structures. The only unavailable part of a course will be activities connected with practising listening skills. While designing a course for hearing impaired people sounds should be replaced with pictures, text, and graphical animation. The authors of a course should in case of this group offer possibility of switching off sounds if the course contains any audio or audio-video materials. In such a case a text containing the same information as the recording should be displayed.

2.3. Visually impaired

Visually impaired can freely use the resources placed on a platform if they have the possibility to scale pictures and fonts to be able to read the information from the computer screen. It would be advisable that this group of learners can support their work in a course by a screen reading program and synthetic speech in order to save eyesight. While designing a course it is worth introducing sounds that would accompany key pressing in a course and enable manipulation of contrast and colour of signs and background so that letters and pictures are fully readable. Those who completely lost their eyesight will have bigger problems with using platform as in their case it is necessary to have special devices allowing computer operation such as: Braille keyboard, Braille computer screen which allow reading information

from the screen. These tools or special software (enlarging, with speech synthesizer) can be bought but it is not always that simple. This type of software is not cheap so its purchase will be a financial barrier in learning a language however, the disabled in connection with a special help program 'Computer for Homer 2010' can apply for a grant that allows buying: computers, software, electronic devices (including reader devices) and Braille devices (http://www.pfron.org.pl/portal/pl/).

Lector software does not always recognize the language of the materials that are read from the computer screen so the distortion of the language may make it difficult to learn. The example of a speech synthesizer is IVONA in its rehabilitation version. It is a Polish speech synthesizer made by Ivo Software, thanks to which the computer will speak. Apart from Braille devices a speech synthesizer is the best way of making computers available to those who are visually impaired. The quality of its voice is comparable to human voice. However, synthesizer is not everything; it works well with an application called Expressivo, which is in a sense individual lector. The program can read different file formats and it records the produced speech as mp3 or wav files. Such files can be replayed by different devices anywhere. Visually impaired can also enlarge and highlight the text being read at the moment. There are special speaking web browsers prepared for the visually impaired such as: $Intelligent Web Reader$ which uses IVONA. The mechanism of the browser divides the text into parts giving an image of the graphics of the text. Moving around the pages is done by using the keyboard. Unfortunately, in case of using such devices a user may encounter problems with voice recognition (http://pcarena.pl/articles/show/87823/Komputer-i-niepelnosprawni.html). Another option for the visually impaired is JAWS Professional - screen reader. It is a module that equips windows environment with sounds and enables it to be read in Braille. It says communicates by the synthesizer and displays the text on a Braille screen. It works in 17 languages including Polish. It works well with different types of synthesizers and Braille computer screens. Another program JMagic enables to enlarge information shown on a screen and it is also adjusted for users with eye-sight problems and for those who spend a lot of time in front of a computer screen (http://pzn.org.pl/wzorcownia1/sprzt-elektroniczny-i-oprogramowanie/2-oprogramowanie-dla-niewidomych-i-sabowidzcych.html).

3. STRUCTURE OF A DISTANCE COURSE FOR THE DISABLED

Structure of e-learning course prepared for the disabled will not differ much from a typical course placed on a platform; however, those parts that cannot

be used by learners should be removed or closed. Typically the first part that should be placed on a platform is an introduction to the course[2]. It is a part in which the course is described in details, its parts, the way of working with tasks on a platform, criteria for marking written and oral assignments, information concerning the way tasks should be handed in to the teacher, the deadline for submitting the assignments, time during which the materials will be available on a platform and criteria for grading platform parts. Each module should be opened for a certain period of time, specified by the teacher, essential for completing the tasks. Such working strategy (specified by the teacher or discussed with learners) is to act as a motivation for the learners to work systematically between face-to-face classes. Independently of the parts of a language course specified below, the course designer (teacher, author) may decide to place many other elements i.e. a vocabulary file for each of the modules (support materials).

An important part of materials provided on a platform are quizzes (tasks) referring to grammar, vocabulary, text understanding. These can be prepared by authors of a course or can be linked to course book materials. The online part will thus include quizzes connected with:

1. Developing reading skills - in this part it is worth preparing a detailed description of the task. If the course is linked to a course book authors should remember that texts from the course book cannot be placed on a platform because of copyrights.
2. Text understanding, grammar, and vocabulary – these are tasks very often designed in a form of quizzes. Each task on a platform should include a detailed explanation. It is essential to specify the number of points to be scored for solving quizzes and the number of trials. It is common that the tasks can be done as many times as one wishes and only the highest score is then recorded. It is up to the author of the course to decide which quizzes can be done only once (i.e. true/false).
3. Theory - grammar reference. We can provide some files with grammar theory prepared by the course designers which would give examples on how to solve a grammar problem. A link to some Internet resources dealing with grammar can also be provided, however in such a case it is necessary to check whether the links work and are still available for the learners.
4. Revisions - make a separate part of a course. These should be designed as self-checked tests in which questions each time will be chosen at random

[2] Due to the learning environment materials are divided into parts called modules or sections.

from the set prepared by course designers. Time counter may be an additional feature which will provide the learner with information on the amount of time necessary to write a test during classes and at the same time the learner will be able to evaluate the amount of the acquired knowledge

5. Introduction to discussion - which will take place during *face-to-face* meeting. It is enough to specify the subject of the discussion and the way the learners should be prepared to it e.g.: by writing down some arguments for or against.
6. Written tasks – due to technical restrictions it is not possible to do written tasks directly on a platform. However, the task itself, its form and instructions including the way of preparation, deadline, can be specified on a platform.

Contents of blended learning course depend on the creativity of its authors, the fact of connecting it (or not) to a leading course book. Educational platforms offer a lot of possibilities and may make a very attractive tool in learning and teaching foreign language. The described model contains Forum which is used as a tool for exchanging opinions between students, students and teacher as well. It is possible to send messages to the participants of the course and return messages to the teacher.

CONCLUSION

Free access to information is a very important problem connected with the development of the information society. Providing everyone (the health and the disabled, the rich and the poor) with free access to information is one of the most important tasks to be completed by government institutions, organizations and companies. In order to take part in all the processes connected with changes in education special programs were prepared: *e-Poland* (2001-2006), *Strategy of Computerisation of the Republic of Poland 2002-2004* as well as *Strategy of the Development of Information Society in the years 2007-2013.* An important issue described in the last of the mentioned strategies is providing a comfortable possibility to use the Internet by everyone including the disabled. Information technology opens access to the vast sources of information that allow personal development, self-education, broadening general knowledge and manners, offer possibilities of full access of the disabled in social and economic life which is a problem highlighted by many international organizations including World Wide Web

Consortium[3]. The priority of the Polish government referring to computerisation is providing a broadband access to Internet among groups threatened with social exclusion as well as those living away of the cities and the disabled as well. The obligation to eliminate exclusion results from European Union directives and the standard of a country. It requires liquidation of technical and economical barriers of the Internet access, computer devices and software. Because of a huge importance of economical barrier, broadband access to the Internet in the nearest years will be funded for those threatened with exclusion so for the disabled as well.

We should hope that together with the development of e-learning it will be available to all the disabled, and better computer devices, software and the awareness of course designers will enable the disabled to use distance courses including language ones.

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[3] Consortium dealing with Internet access, it involves everyone who is interested in the development and promotion of standards that would improve Internet access for the disabled.

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CONCEPTS OF COLLECTIVE INTELLIGENCE AND PROCESS OF CREATING A KNOWLEDGE

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Abstract: *The purpose of the article is present the concept of collective intelligence models and their role in the process of creation collective knowledge. The author hypothesized that the Polish education system is dysfunctional for innovation, cooperation and action in the group. Notes that this highly individualistic trend extends to all levels of education, and is specific for the individual-oriented researchers. The author also points out that this individualistic trend is break by the concept of learning 2.0, which becomes the basis for cooperation with others.*

Keywords: collective intelligence, innovation, cooperation, learning 2.0, the open educational resources.

1. CONCEPTS OF COLLECTIVE INTELLIGENCE

Collective intelligence can be understood as the result of common actions of individuals, often supported by computer networks. Don Tapscott and Anthony D. Williams defines collective intelligence as "the cumulative knowledge that arises from the decentralized choices and judgments that are the responsibility of the independent groups of participants" (Tapscott, Williams 2008, 19). The authors note that a key role in the creation of collective intelligence plays technology because computer networks allow for combined intelligence, knowledge and creativity of many people,

contributing to the society prosperity and development (Tapscott, Williams 2008, 69). The term converges with the collective intelligence is the wisdom of crowds. The author of the concept of wisdom of crowds is James Surowiecki, who believes that information is worked out in a group are often better than those generate individuals. The term wisdom of the crowd somehow suggests that we are dealing here with some form of crowd as psychology traditionally understood. This is not (at least in the case of the Surowiecki concept), which indicates that the wisdom of crowds is the result of action collection of individuals who are independent in decision-making (Surowiecki 2004). Gustav Le Bon says, that the crowd does not have a great ability to reasoning, but a great ability to act. According to Bon's in the crowd fades awareness of their own identity, and feelings and thoughts are the same for all members. The author points out that in the crowd we are dealing with the formation of the so-called collective soul, which contributes to the creation of a collective nature "which is governed by the law of mental unity of crowds" (Le Bon 2004, 15). The crowd thinking is far from the effects of collective intelligence. The crowd is characterized by the lack of criticism, difficulties to discern truth from falsehood, the inability to judge rightly, and the tendency to unauthorized generalize (Le Bon 2004, 35). In the case of collective intelligence, we are not dealing with deindividuation, state of limited consciousness, or collective unconscious. While individuals acting collectively, work out commons decisions, their actions are not devoid of individualism. Collective intelligence can be rational and reasonable in their actions, and the crowd generally characterized by lack of reflection, impulsive and instinctive action.

Surowiecki points out that not every mob (group) is wise. To achieve this collective wisdom are needed at least four conditions necessary for the constitution of the collective wisdom: diversity, independence, decentralization and aggregation. Surowiecki defines diversity as the diversity of opinions and the right to express them, regardless of how much they are unconventional. Independence according to researcher, expressed in the fact that the individuals opinions are not determined by the opinions functioning in their environment. This argument is in contradiction with the mechanism described by Elisabeth Noelle-Neumann as the spiral of silence. This researcher, argues that it is unlikely that a man loudly voiced their opinions, when he thinks he is in the minority. As a rule, articulating their

own opinions we refer to the current knowledge and our common sense of beliefs about what opinions are prevail in society. Key role in formulating our opinion played mass media, because they broaden the scope of our direct observation. People are afraid of rejection induced by the opinions not compliant with the prevailing climate of opinion, what the researcher calls "fear of isolation". People watching responses of the environment, perfectly realized which their behavior/opinions are approved and which are not. To avoid an isolation they refrains from uttering an opinion contrary to the opinions of the majority (Noelle-Neumann 2004). Surowiecki, however, is aware of the fact that the crowd may make bad judgments, because the members of the crowd were too conscious of the opinions of others and rather reinforce their own opinions under the influence of others than pursue their own beliefs. Probably a significant role plays here homofilia rule, understood as our preference for similarity, which makes the people tends to surround himself with people similar to them in terms of several variables: age, education, profession etc. Decentralization is expressed according to the scientist through specialization of individuals and the use of everyday knowledge, and aggregation means a tendency individuals to express their own judgments in decisions taken collectively (Surowiecki 2004).

In addition to the concept of wisdom of crowds, converging with the concept of collective intelligence in the literature works the concept of symbiotic intelligence, which is attributed to Norman L. Johnson. Johnson takes the view that the symbiosis of humans and intelligent networks, leads to collective problem solving, which are the result of selecting one of many possible solutions (Johnson http://collectivescience.com/ symintel.html).

Satish Nambisan and Sawhney Mohanbir note that as a result of collective cooperation constitutes a "global brain". Global brain is a metaphor of connecting people through the operation of information and communication technologies which connect them in a "ecological" whole. As the Internet becomes faster, and its extent is global, connecting many people and becomes a global brain of humanity. This term created in 1982 by Peter Russell which comparing society connected through computer networks to the brain. Russell heed an attention to the processes occurring in the brain of the human embryo, which passes through two major phases of development. The first is the huge explosion in the number of nerve cells. From the eighth week after conception, the number of neurons is increased by many millions in one hour.

After five weeks, the process slows down, brakes, which concludes the first stage of brain development. The brain then goes to the second stage of its development, in which billions of isolated nerve cells begin making calls to each other. At the time of birth newborn nerve cells may communicate directly with thousands of other cells. Brain development after birth is subject to the further process of the spread connections. Until adulthood, many nerve cells make direct connections with the quarter of the millions of other cells. According to Russell, similar trends can be observed in human society. In the past few centuries, the number of "cells" in the brain has a global proliferation. Although population growth is now slowing down in the same breath we move to the next stage of human relations in which billions of human minds are connected into one integrated network. The combination of communication networks and society makes it begins to resemble the planetary nervous system. Russell points out that when it comes time to communicate our planet has shrunk so much that the other cells of the global brain, are not farther than a man limb from his brain (Russel 1982). Thus, the vision of a McLuhan global village becomes today a reality.

Nambisian and Sawhney believes that the term global mind should be interpreted as differences in the partners participating in the process of innovation in terms of industry knowledge, creative input, but also the competence, education and geographic location. In the search for innovative ideas, companies are increasingly turning to external partners' support. This process applies not only to companies but also scientists, researchers. Nambisian and Sawhney observe that innovation in the companies were created while maintaining secrecy, confidentiality, today to compete, grow, companies must be open to cooperation with the external environment (Nambisan, Sawhney 2007). Theory of global mind is close to the concept of the Teilhard de Chardin noosphere who defines it as the sphere of human thought. This term comes from the Greek nous (νοῦς) - mind and sphaira (σφαῖρα) - the sphere. For Chardin's noosphere represents the unity of souls (de Chardin 1966, 63) and he was convinced that the strength of connections between individuals will continue to grow (de Chardin 1966, 17-18). It is worth noting that the Greek nous, from which derive from the concept of the noosphere, does not mean the reasoning skills of average mind, but the ability of intuition, the ability to cross the multiplicity of discourses, to overcome them vision of unity. For the Greeks, nous was a

form of spiritual mind, which is primarily used as an instrument of transcendence (King 1989, 81). The idea is assigning matter features of not only of life, but consciousness is analogous to the human psyche we find also in the panapsychism concept. This term is a portmanteau of word pán - everything and psychḗ - breath, soul. This term is coined by Italian philosopher Francesco Patrizi in the sixteenth century. It means that all things have their mental aspect, and all objects are connected by a single experience or points of view. Panapsychism is a doctrine, which assumes that the mind is a fundamental feature of the world, which exists throughout the universe (Seager http://plato. stanford.edu/ entries/panpsychism).

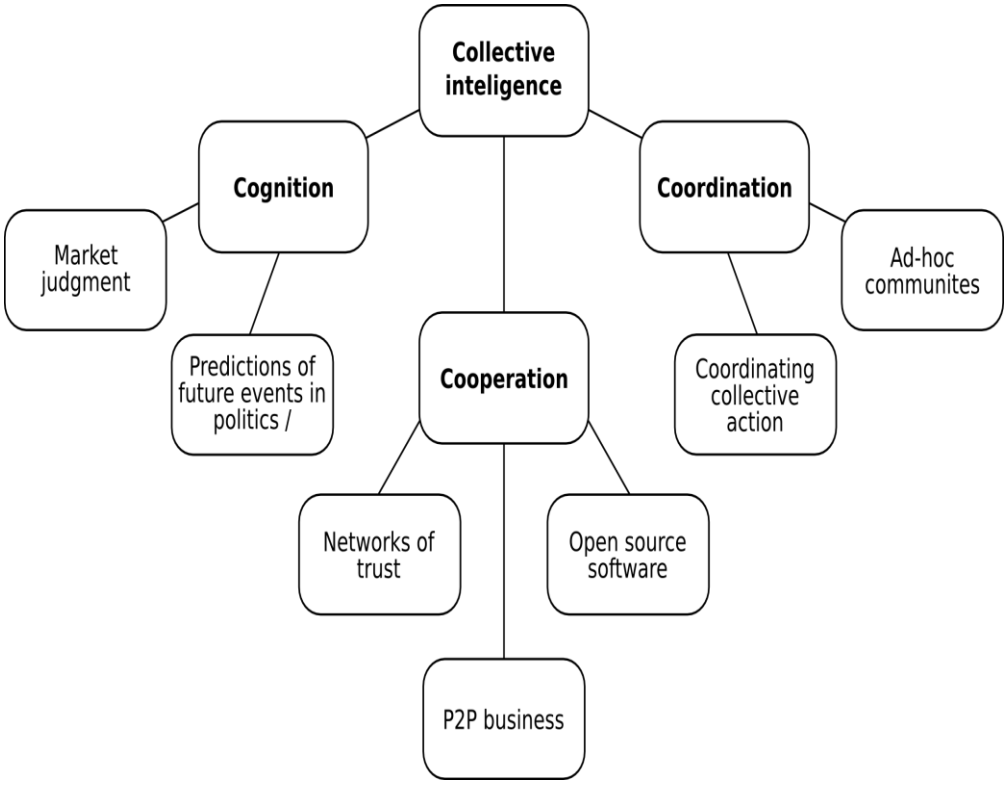

Figure 1. Model of collective intelligence

Source: own, based on: O. Generozova, http://en.wikipedia.org/wiki/File:CI_types1s.jpg, access: 12.07.2011.

2. COLLECTIVE WORK AND POLISH MODEL OF EDUCATION

Unfortunately the Polish education system is dysfunctional for the process of creativity, innovation and collective work. P. Dobrowolski makes accurate diagnosis of the Polish school: "The Polish meaning of education is dominated by the Enlightenment thinking that the child is a tabula rasa (clean sheet), which adults need to save the wise information. Not for us ideas of American educators, who are already in the late nineteenth century, offered to children from fifth grade to allow a significant portion of courses to choose. They knew by then that the true motivation for learning comes from the choice of what interest and gives somebody a joy. Us somewhere the 200 years between modernity and Enlightenment escaped and Polish schools still rely on long-outdated theories. The mainly principle remains compulsion to memory assimilate a resource of knowledge specified in the ministerial directives. Independent thinking is a vice, working in the group is suppressed, and the issues of developing the individual talents of children remain insignificant" (Dobrowolski 2009). It is not important whether the child thinks, most important is the ability to enter the key and can interpret the poem interpret the poem (the best analogy, as a teacher).

Educators seem to displace from the awareness the fact that today the average college student spends less than 5000 hours on reading, but over 10,000 hours playing video games, 20,000 hours watching TV. Computer games, email, internet, cell phones and instant messaging are integral parts of their lives (Prensky http://www.marcprensky.com/writing/Prensky%20-%20 Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf). How, then this virtual, constantly changing environment, combined with a static, one-sided, passive teaching observed in many Polish schools?

According to Tapscott this model of education has no raison d'etre. Students want to consider education as a good and interesting game. Digital generation is smart but impatient and does not agree to passive listening sided lecture. Tapscott believes that teachers need to come down from the cathedral, to begin to listen and talk, they should encourage students to independently explore the world, but not limited to controlling information (Tapscott 2010, 230-237). What is the cause, so a significant gap between what students expect, and how the teaching process is realized? Helpful in clarifying this issue seems to be the concept of digital natives and digital

immigrants Marc Prensky. Digital natives were born after 1983, growing up in an environment of new technologies. Growing up in an environment highly technological, makes the virtual environment for them primary, natural environment. When it comes to acquiring knowledge digital natives quickly get bored, they have difficulty understanding the long and complex text, preferencing picture and sound. Mobile devices are for them essential personal items, which bind their daily existence, the Internet language is their lingua franca. Digital immigrants (most of today's educators) are a persons born before the 1983. In the process of teaching they prefer patient and regularity. They have problems with understanding what is happening in virtual reality. Against the new media they are suspicious (Prensky http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives, %20Digital%20Immigrants%20-%20Part1.pdf). Digital immigrants, therefore, although trying to learn the new media language, trying to decode the meaning assigned by young people to new technologies, similarly as immigrants usually remain outsiders, not assimilating to the environment of cyberspace. Although they usually overrun the ability to use the Internet and computer, the use of these tools is not a natural part of their everyday life.

Table 1.

Characteristics of digital natives and digital immigrants

Digital Natives	Digital Immigrants
prefer text	prefer image and sound
quickly get bored, they are impatient	systematically
prefer free access to information	prefer one-sided model of teaching
new technologies treat confidently, creatively	new technologies treat with caution

Source: own, based on: M. Prensky, Digital Natives, Digital Immigrants, 2001, http://www.marcprensky.com/writing/prensky%20-%20digital%20natives,%20digital%20immigrants%20-%20part1.pdf

As Henry Jenkins rightly notes the school as an institution responding with a delay to the emergence of new participatory culture. New skills that students should possess today boil down to (Jenkins, Clinton, Purushotma, Robison, Weigel http://digitallearning.macfound.org/atf/cf/%7B7E45C7E0-A3E0-4B89-AC9C-E807E1B0AE4E%7D/JENKINS_WHITE_PAPER.PDF):

- Play: the capacity to experiment with one's surroundings as a form of problem-solving,
- Performance: the ability to adopt alternative identities for the purpose of improvisation and discovery,
- Simulation: the ability to interpret and construct dynamic models of real-world processes,
- Appropriation: the ability to meaningfully sample and remix media content,
- Multitasking: the ability to scan one's environment and shift focus as needed to salient details,
- Distributed Cognition: the ability to interact meaningfully with tools that expand mental capacities,
- Collective Intelligence: the ability to pool knowledge and compare notes with others toward a common goal,
- Judgment: the ability to evaluate the reliability and credibility of different information sources,
- Transmedia Navigation: the ability to follow the flow of stories and information across multiple modalities,
- Networking: the ability to search for, synthesize, and disseminate information,
- Negotiation: the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

A situation in which the teacher has a complete knowledge and play the role

of the person who only carries into effect the provided knowledge is slowly retreating into the past. As rightly notes the authors report *Young and the media. New media and participation in culture*, favorable for both parties is situation when the teacher is simply a partner (Filiciak, Danielewicz, Halawa & others 2010, 124). Increasingly this is that the lecturer/ teacher gains knowledge from their students/pupils. Some teachers break yet functioning among educators convinced of his own omnipotence, realizing that no one knows everything. However, the full democratization of the learning process is far away for us. According to Henry Jenkins we can do much to the educational process for students has been interesting and inspiring. Teachers of history might, for example, together with their students to discuss alternative scenarios of historical, to speculate on what might happen if for example Germany won World War II, or Native Americans colonized Europe. There is no right or wrong answers to these questions, while they may inspire your own research. This type of tasks place emphasis more on creative thinking rather than knowledge reproduction, at the same time allow students to feel less intimidated by teachers and experts (Jenkins, Clinton, Purushotma, Robison, Weigel http://digitallearning.macfound.org/atf/cf/%7B7E45C7E0-A3E0-4B89-AC9C-E807E1B0AE4%7D/JENKINS_WHITE_ PAPER.PDF). Passionate may offer as much as a scientist, an expert and his knowledge becomes as valuable as knowledge expert. Thousands of volunteers can quickly and efficiently create innovative and good projects. The initiators of social projects which created together on the Internet (which a perfect exemplification is Wikipedia), assume good will and responsibility of their contributors. Partnership production, based on the ideas of the common good (common-based peer production), allows to create from the dispersed activities of many volunteers a valuable whole (Hofmokl, Tarkowski http://www.ebib.info/2006/73/hofmokl_tarkowski.php). In the social production of content is not only a lack of hierarchy (which determines the image of individual tasks), but there is no limit to the number and composition of the team Hofmokl, Tarkowski http://www.ebib.info/ 2006/73/hofmokl_tarkowski.php). Therefore, while such projects may work with everyone, regardless of whether a layman or an expert in the field - just the good intentions, internet connection and computer.

3. POLISH INNOVATION

The *Report on Innovation of Polish Economy* rightly noted that universities are indeed forging talents, but they are not sources of innovation (Bendyk, Czechowicz, Fazalgic & others 2011, 16). Schools and universities do not teach team work, team projects carried out are rare. The authors note: "In schools and universities promotes individualism, while the most important is teamwork" (Bendyk, Czechowicz, Fazalgic & others 2011, 22). Teachers have a problem with the assessment work, which are the work of many people, hence the preference for individual projects, which are easier to evaluate. In many cases, teachers even kill this creativity, are reluctant to tolerate going beyond a strictly defined program and standards. It is well seen when a child sticks to the canon and does not go beyond what is realized in the classroom. Almost the only form of expression is the student's test, class test or oral statement at the board. Design work, visualization, group preparing mock-ups, is in a Polish school absent elements. Even if teachers decide to design tasks, they are so flexible and banal that the students rewrite them from the internet. There are even those teachers who require strict command execution, and failure to comply with them, even if it was for developing the student is punished. Far more important than learning for creativity, is to develop an absolute obedience to the teacher. This authority is not built on values, rather fear, coercion. P. Dobrowolski notes: "The officials, teachers, and probably the majority of Poles cannot imagine how you can lead a lesson where every student has read another book" (2009). And yet very aware of their own choice, not imposed from outside can make that a child will reach to read with passion and interest. Unfortunately, sometimes it happens that "the role of the Polish teacher is catching student's on ignorance and punish him for it. (...) Talk about the difference of views is not likely to happen, because I might disturb the flow of rework the material. And that any teacher is not needed. It is hardly surprising that so trained Pole has problems of substantive discussions, search arguments, defending their case, convincing others to them and propose a compromise. Prefer to be surrender, because in the course of education, such behavior was rewarded" (Dobrowolski 2009). Why, then, these same teachers who premium on passivity and blind obedience, mediocrity, and then complain students lack creativity, creative thinking, or criticism. If they only require from their students is playing by heart unreflecting of rules, where and when could

appear that time of reflection? Stanislaw Ossowski, wrote that the role of universities is to develop attitudes, which he described as “disobedience in thought”. However how develop in students the attitude, negative to the entire school stage of socialization? How to convince students that studying is not just a utilitarian stage of their lives, but also the stage broaden their horizons, develop their own passion. Market requirements, may not be in contradiction with the idea of the university. It is worth noting that in many cases, non-institutional action brings much better results than the operation within the structures in which most of the steps is a routine, precisely defined, which implying a loss of creativity and creative ferment. Roman Galar writes: “98% of the radical improvements comes from the laboratories of small businesses - those whose owners (often also the originator) are risking their own independently resources” (Galar 1990, 101). Thus, the so-called critical innovation, do not stem from 98% in universities or large corporations, but in small laboratories, garages.

4. SCIENTIST INDIVIDUALISM AND GROUP COOPERATION

Unfortunately, in many cases we do not want to share our ideas with others. This distrust of others leads to an attitude that expresses itself in fear "that someone would steal us our original idea, and therefore hide it in the drawer” (Bendyk, Czechowicz, Fazalgic & others 2011, 24). No exchange, eliminating the potential, often very creative criticism makes the idea is dying before it can even sprout and give fruit. Sharism culture[1] is contrary to the individualistic and conservatively oriented Poles. Unfortunately, few of us can and want to work as a team. The report's authors note on the Polish innovation “Poles tolerate only short-lived compounds, such as confederations, inns, kidnapping women, sleigh rides” (Bendyk, Czechowicz, Fazalgic & others 2011, 25).

In science, referring to other authors is extremely important and valuable, but the authorship as such, is not blurred. As noted by Andrzej Radomski: „It appeared that the humanist work is simultaneously a kind of expression of

[1] Sharism is a concept known as the revolution of the spirit. Its guiding principle is the idea: The more you share, the more you get. This ideology promotes a culture of sharing as a way of society and economy. This concept is based on models of collective intelligence, free software and open source, free culture and creative commons.

maker: his personality, consciousness, experience, biography, value system, etc. factors. Authorship of various works becomes the basis for their science careers: promotions, awards, authority, prestige and fame" (Radomski 2010, 105). However at the same time, the author notes that many papers hide authorship of certain concepts, but it's not about masking one's conscious creativity, but such a number of inspirations, reflections that arise after reading the previously works. Consequently, it is difficult not to agree with Radomski who believes that even in science the mechanism of the collective intelligence works, because if taken into account all those who have contributed to creation, we are always dealing with the collective activities (Radomski 2010, 106). In many cases, the reviewers, but also the first authors of the article/book, significantly affect the shape and character of work. Ludwik Fleck notes that knowledge have social character, since almost every exchange of ideas leads to a situation where there are ideas, concepts and standards are difficult to assign a particular individual. This raises the kind of collective thinking (Denkkollektiv), which is characteristic for a certain style of thought (Denkstil) (Fleck 2006, 325), which also provides the discriminant of this group, distinguishing it from other schools, trends, styles of thought, etc. Fleck takes the view that the collective nature of scientific knowledge becomes evident today, as support by the mechanisms of group cooperation, group co-authored many scientific publications, a large number of journals, surveys, conferences, symposia, committees, meetings, societies and congresses, which in turn implies that that every scientific cognition is social action, because in fact refers to the knowledge and skills provided by others. Fleck in their deliberations concerning the collective nature of scientific knowledge, goes a step further - even says that a single, isolated man would be condemned to intellectual sterility (Fleck 2006, 325-327). Is difficult to disagree with this statement. Conferences, symposiums, congresses, are not only social gatherings, they are primarily oriented meetings to what others are doing in my field, what new, interesting topics were raised by colleagues, as well as the possibility of cooperation. Sometimes a single sentence, an intriguing thought, fertilizes our mind, not allowing the rest, until it is at least partially the answer to our question. Collective work, forcing scientists also external factors. Progressive complication of the social structures, their increasing complexity, implies pressure to undertake multidisciplinary research and cooperation, which facilitates understanding and clarifying many issues. Increasingly longer

unsufficient tools and methods that use the representatives of the discipline. Scientist have to reach for the methods and tools developed on the basis of other disciplines.

As evidenced M.E.J. Newman average number of authors of scientific papers over the last sixty years has increased considerably in many areas doubling or even succumbing tripled. In the case of computer science today, the average article has 2 authors (2.22), in physics 3 (2.66), in astrophysics 3 (3.35), in biomedicine 4 (3.75). Even more surprising fact that there are works which have from 200 to 500 authors. Newman points to the collective record-breaker, work with a 1681 (sic) authors (2000). Unfortunately, these seemingly optimistic analysis of Newman, still confirm the individualistic-oriented work of the humanities and social sciences.

5. SCIENCE 2.0

Modern science through the spread of online communication tools, moving towards a model called science 2.0. D. Tapscott and A. Williams wrote: "Here comes the new era of collaborative learning, which will significantly accelerate the process of scientific experimentation and learning. With the new open publications and new Internet services, the vast knowledge resources will be put in the hands of individuals, communities and partner network will entwine the world (...) Science, requires access to ideas, knowledge and culture created by others now and in the past. (...) Science has become a public good, and not the exclusive property of the privileged few" (Tapscott, Williams 2008, 220-224). According to researchers, science 2.0 is mainly based on co-teaching, in which the Internet becomes a workspace for many people involved in science. Internet at an unprecedented scale allowed collaboration the specialists in many fields, efficient and quick reviewing of articles and research projects. According to the study S. Cisek science 2.0 appoint three trajectories (Cisek http://informacjacyfrowa. wsb.edu.pl/ pdfs/nauka%202.0.pdf):

– widely understood communication in scientific, dissemination of research results, improving the exchange of ideas and development of cooperation between scientists, breaking the barriers between disciplines, etc.,

– development of scientific knowledge and understanding of term "scientific" in general, for example in the context of the review (peer review, the classical verification versus social verification), recognition of the publication as a scientific, philosophical problem of demarcation of science and non-science, for example: Who is "better" qualify method/ knowledge as science - a single genius, traditional structures and procedures, or "collective intellect"?,

– organizational and social aspects of science, the emergence of virtual communities of scholars, the emergence of authorities.

It should be noted that the restriction to demonstrate the changes of a functional nature, i.e. to facilitate communication (fast and effective communication), organizations (the affiliation to the organization of conferences, meetings) would be unauthorized simplify the term science 2.0. We are dealing with the changing paradigm of science that is based on cooperation, openness of knowledge, which allows changing the essence of science and scientific. Thus, positive and negative effects of science defined as 2.0, can be reduced to (see Table 2):

Table 2:

Properties of science 2.0

Features	Positive consequences	Negative consequences
(1) ease and speed of publishing (2) potential immediacy of access	- rapid dissemination of both opinion and scientific discoveries, without going the traditional, often lengthy process of publication in journals, - conduct discussions and exchange views in almost real time, - acceleration of information flow in science	- spread, unchecked, and even fraudulent or dangerous contents

(3) potentially universal access	- possibility of effective dissemination of research results among the general public and for formal education and self-education, - facilitate the "migration" of knowledge between disciplines, interdisciplinary science increase	
(4) often informal in nature - resulting in the reduction of barriers to science communication: linguistic, social and other	- openness and pluralism, - turning to the discussion of students, amateurs, novices, sometimes offering a fresh look at "old" problems - free market of ideas	- the appearance of expression worthless in terms of content, too emotional, or even offensive
(5) visibility and increasing the role of the community of scholars 'collective mind'	- intensification of social control, including easier to "capture" plagiarism, - perhaps - faster development and improve the quality of research through facilitated discussion, cooperation and mutual inspiration	- publication of the personal conflicts - black PR

Source: own, based on: S. Cisek, Nauka 2.0: nowe narzędzia komunikacji naukowej, Nauka 2.0: nowe narzędzia komunikacji naukowej, http:// informacjacyfrowa.wsb.edu.pl/pdfs/nauka%202.0.pdf, access: 14.07.2011.

As stated by P. Levy "Nobody knows everything, everyone knows something. All knowledge has humanity" (1997, 20), every surfer which is not an expert in the field has much to contribute to the project. By an open publishing is possible a process of propagation of knowledge, which is often had been limited to niche specialists in the field. Unfortunately, many professionals are not open to collaboration, restricting itself to its network of small worlds. Distance have no longer any meaning today, the Internet enables the cooperation of everyone interested in a given issue. Time and space are not limiting factors today, the problem is rather large dispersion of Internet resources. Scientists have at their disposal thousands web sites that have them

facilitate collaboration and cooperation. In our country we have at least dozens of such sites. Their form, however, is more like a static internet web 1.0 formula, than the dynamic internet web 2.0. Usually on such Web sites are typically information content, sometimes with the possibility to comment on published articles, but rarely with the possibility of synergy, whereby the effects of working together far outweigh the summed actions of individual units. Learning 2.0, and in fact postscience characterized full egalitarianism, equating the status of expert and amateur. Freshness of view, in many cases guarantee creative ferment, originality gaze, the free market of ideas, liberated from restrictive pattern. A. Radomski writes: "Many interesting problems humanities could be discussed and solved in the framework of collective intelligence. Here, no longer mattered scientific degrees and titles, just ideas and imagination. Participate in the collective minds can people would also not related to every day of science - in line with the slogan: everyone can be learned, anyone can carry on constructive knowledge" (Radomski 2010, 69). This open paradigm of science in many dimensions met with sharp opposition from the scientific community, are reluctant to equate the status of the position of an amateur scholar, layperson, hobbyist. Stuck in a warm cocoon of their own degrees, habits, value their status quo. Even publishing in the most prestigious journals of his field effects they are limited to a dozen experts in their field. Open publishing significantly broadens the circle of readers, making a living thought and be creative reinterpretation. Often, however, scientists are afraid of openness, treating it as a threat, and receive any form of criticism threat as *ad personam*, negating the possibility of other creative influence on the shape of their works.

To increase the potential of public works (including the publication of a scientific nature) is postulated on the basis of publishing OER Open Educational Resources which are defined as materials that are publicly available on the internet (no access control) published together with the right to further use and develop in an open manner (Grodecka, Śliwowski 2011, 6). OER use free licenses, which in practice means that it is permitted Grodecka, Śliwowski 2011, 7):

- re-use of materials developed by others,
- change, transform, adapt to their purposes and needs (eg, translate texts in foreign languages),

– combining with other materials (re-mixing songs, such as text with audio),

– re-distribution - to share their work with others.

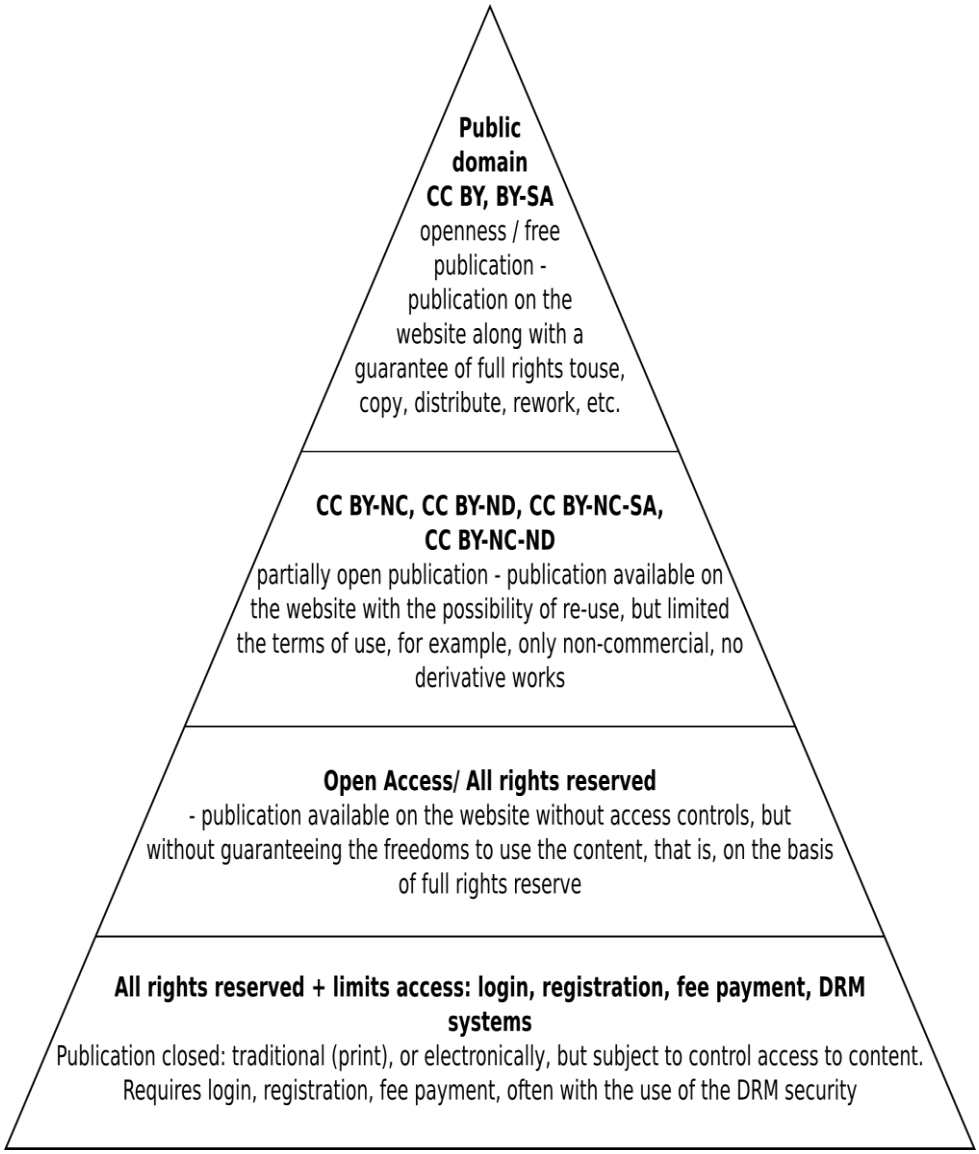

Figure 2. Levels of openness

Source: own, based on: K. Grodecka, K. Śliwowski, Przewodnik po otwartych zasobach edukacyjnych, Koalicja Otwartej Edukacji, 2011, s.13.

The idea of the openness of the work is based on the belief that knowledge is a common good and everyone should have the right to adapt it to their own needs, improve, modify.

CONCLUSION

Contemporary knowledge creation is significantly transformed. New technologies at the forefront of the Internet contribute to the changing paradigms of knowledge creation and practice of science. The constant social change, complicating the social and cultural mechanisms requires the cooperation of scientists from many disciplines. Scientists are increasingly aware, in order to effectively respond to environmental problems, it is necessary co-operation of specialists from different fields of science. At the same time easy access to alternative sources of information, the common of the media, will undermine their monopoly on the provision of certain knowledge. Publishing and reviewing mechanisms are changing the results of their scientific work, which increasingly has an open character, which favors the propagation of knowledge and widens the circle of potential readers. We pass from the model of the cathedral, so the creation of employment-based professionals, scholars, to bazaar model, in which everyone - even a layman and an amateur can contribute to building a common knowledge. Pupils rejecting authority, reject the dogmatic truths communicated to them ex cathedra. They want to discuss and cease to treat their teachers as oracle.

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DIGITAL MEDIA IN ONLINE COMMUNICATION OF EDUCATIONAL INSTITUTIONS

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***Abstract**: The Internet and proliferation of the digital media have affected a way universities work. Thus the question is if the university can be re-built online, fully capitalizing on the web potential for knowledge administration, without sacrificing what makes the university special in the first place: locality. The paper outlines a web portal incorporating social features of digital media to enhance and streamline communication between schools, lecturers, students, prospective students, businesses and the public. The project targets complex utilization of the digital media in advanced education, primarily at the Faculty of Mass Media Communication.*

Keywords: knowledge, locality, social network, collaboration, motivation.

The open-source software community is simply too connected to focus its tests and maintain its criteria over an extended duration. A global process is no test at all, for the world happens only once. You need locality to have focus, evolution, or any other creative process.

Jaron Lanier

INTRODUCTION

Simply put, we are trying to launch a web site that will be an online function of the Faculty of Mass Media Communication. Of course, the faculty has been running its own page under the university site, so it already is represented online. Our argument is that the existing web representation is seriously lacking and insufficient. It is less a function of the school and more a function of the Internet (i.e. just another site among millions) and it is not

essential to the school. Yet the school is comprised of people (students, teachers, staff members), for whom the Internet is becoming ever more essential and it is about time to make the Internet a function of the school, too, otherwise the Internet threatens to obscure the school.

Remarkably, a start-up called Inigral has recently developed a Facebook application for higher education institutions (*Schools App*). The business solution sells to U.S. universities for thousands of dollars at the time. We find this rather ridiculous and ineffective in our environment. Dependence on the Facebook is troubling, because no matter how hard the Facebook or other social networking sites pretend for global relevance, they reduce and fragmentize web experience (they are still services with specific business plans catering specific needs). The creators of the *Schools App* admit the reduction explicitly, as they promise to "*engage them* [students] *in ways that* [Facebook] *Pages and Groups can't*."[1]

University is a centuries old system of storage, sharing and advancing knowledge. It used to be quite expensive and precious, until we made most of schools public and thus open to just about anyone with sufficient literacy skills. The Internet, though much younger, is being described as "*the largest repository of knowledge ever created*" (Scaruffi). It is also open to just about anybody with sufficient "computing literacy". It could seem that the Internet makes university obsolete. However, there are significant reasons against such claims. The knowledge is stored on the web as *data*, bits of information, regardless if it originally comes from a book, picture, lecture etc. It tends to obscure its sources and its authors. It is becoming increasingly anonymous and depersonalized. A valid online representation of the school should stress just those features of university knowledge distribution that reverse such tendencies.

We should discard the notion of the Internet as a *non-place*. Those mighty server farms that enable gigabytes of storage on your email account are posited somewhere. Those people sharing all kinds of private information with anybody who is willing to receive it do post from somewhere. The university usually does have a building or more. It is a localized, *physical* place and a space. There are people who attend it and who produce, share and receive knowledge. And they do it in person. As Jaron Lanier puts it: "*The tenure system and many other aspects of the academy are designed to*

[1] see http://inigral.com/howitworks/.

support the idea that individual scholars matter, not just the process or the collective."[2]

The school that claims to study and teach knowledge of media should be able to use the Internet in more ways than just as another news and public relations channel. There is no substantial, long-term advantage or improvement over other schools to be gained from this, since pretty much every school already does it. The media school can contribute to shaping the very medium by making the medium an integral part of the school. We did this with anything from press and radio to movies. Since we are able to broadcast or share any media over the Internet, the sooner we sort out the web site, the sooner we become a distinct (i.e. original) provider of authorized knowledge in the environment craving for such.

To meet this proposition we must embrace some web features and shun other. We should use collaborative and communal qualities, encourage our users to participate in building and organization of the site (so as to make it really their own habitat), while restricting anonymity and copy-paste mentality of Wikipedia frequenters. The site should represent the academy as a physical source of knowledge, comprised of individuals and groups with their own interests, beliefs and assumptions. Various outputs should compete for attention and appreciation correspondingly to academic values. If we don't try to impose our standards on the Internet (at least its slight chunk we administer), we subscribe to standards of "viralism", "hive mind" or "trolling". Why would we want to bring out just the most common of our students and teachers when we can also try to bring out the best of them?

1. ONLINE SCHOOL COMMUNICATION

The fmk.sk portal will be built on the WordPress, a well-known content management system (CMS), more precisely on its extension. Despite the common notion that the WordPress is mainly an open-source blogging platform, once enhanced with social features of the "completely open source" BuddyPress plugin, it can be used to run a complex social network.[3] It is already effectively in use by such projects as The Academic Commons of

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[2] Lanier, J.: *You Are Not a Gadget*. Alfred A. Knopf, New York, 2010, p. 45.

[3] See http://buddypress.org/about/story/, suggesting uses as "a campus wide social network for your university, school or college," "internal communication tool for your company" or "niche social network for your interest topic". Originally developed by the Automattic, Inc, the BuddyPress, as all the WordPress, is now curated by the WordPress Foundation, a charitable organization.

The City University of New York, an online, academic social network or Cultura Digital, a Brazilian Culture Ministry's social network, apparently intended to "democratically create and build a public policy of digital culture", currently populated with 8000 users.

Cultura Digital's "about" refers to Kevin Kelly's 2009 article "The New Socialism: Global Collectivist Society Is Coming Online", a sort of a neo-marxist spin for the Internet age[4] with multiple potentially positive implications for public universities. However, the narrative is undermined by Kelly's claim that the new socialism "*is not an ideology. It demands no rigid creed. Rather, it is a spectrum of attitudes, techniques, and tools that promote collaboration, sharing,* [etc.]."[5] A "spectrum of attitudes, techniques and tools that promote something" itself seems like a good definition of ideology, regardless if it demands a "rigid creed" or not. Making religious-like belief a necessary condition for ideology betrays Kelly's bias. He thinks he is better than *that*. At least Kelly is aware that "most free markets have socialized education." Admitting our ties with the very public (or socialized) institution of higher education in Slovakia, we can follow Kelly's argument this far.

The WordPress-based system, extended by custom functional tweaks, will serve as a stand-alone social network - with long-term sustainability aspects in mind (mobile device compatibility, valid markup and compliance to accessibility standards). Additionally, output queries will be optimised for communication with other social network services (Facebook, Google+ etc.), and for direct e-mail/message notifications, so that users will receive real-time updates trough their favourite communication channels. There is also a possibility to develop our own application for mobile platforms, providing that we analyse how our students use them.

Users of the site will be assigned specific roles, depending on their being staff members, teachers, students or outside visitors. The new site will allow its users to publish important news regarding scientific or academic issues and day-to-day info service. Teachers and staff will have a straight channel to tell students that e.g. a lecture is cancelled or a new book on television has been published. There is no need to run such day-to-day issues through two-steps administration system. Of course, users should have an option to specify which types of updates they want to receive.

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[4] of a kind that was deliciously parodied in Richard Kelly's dysthopian Southland Tales (2010).

[5] Kelly, K.: *The New Socialism*. 2009.
http://www.wired.com/culture/culturereviews/magazine/17-06/nep_newsocialism

Internal communication, we believe, could be intensified through various social media features implemented in the site. Users will be encouraged to create their personal profiles. User profiles are designated to help distinguish users as university students (and teachers) by stressing their school-related activities. Every profile thus will be (potentially) a part of ever growing database of essays, articles, final theses, video or audio outputs etc. Individual entries would be subjected to ratings of other users – with separation of students' and teachers' ratings – and best rated entries would be highlighted and featured. By this measure, we hope to motivate competition between students. As with news, users would receive notifications about any new entries in the database (though they will be able to filter them out). We also want to include public and private discussion boards for classes and specific student groups, with non-anonymous posts, maximum transparency and, preferably, avoiding unnecessary duplicity (*group.fmk.sk*).

2. COLLABORATION: SHOW ME THE MONEY

Collaborative production seems "*considerably harder than simple sharing, but the results can be more profound*," says Clay Shirky. *"New tools allow large groups to collaborate, by taking advantage of non-financial motivations and by allowing for wildly differing levels of contribution.*"[6] As a working example of distributed collaboration, Shirky chooses Wikipedia, one of the most popular websites in the world, the supreme online encyclopedia at the present time, based on non-paid contributions of millions of users. Of course, to make collaboration work, enough people have to care about the project (what Shirky calls "virtuous circle"). According to Lanier's critique, though, "[in the *wiki* model] *knowledge of a human authorship of the text is suppressed in order to give the text a superhuman validity*." Wikis tend to erase a point of view and "*promote the false idea that there is only one universal truth in some arenas that isn't so*".[7]

For developing the site as a knowledge base, we propose a model which the *wiki* is only a part of. *Wiki* is a service and shouldn't be mistaken for a "source" of knowledge. Only registered users would be able to add information and their edits shouldn't be anonymous. Editorial rights will be shared among teachers and students (or graduates). This *wiki* would be subsumed under the *groups* and would serve primarily to internal educational

6 Shirky, C.: *Here Comes Everybody*. Penguin Group, New York, 2008, p. 109.

7 Lanier, J.: *You Are Not a Gadget*. p. 31 and 61.

process. (We assume that both students and teachers would appreciate a chance to affect validity of published information.)

An alternative organization of knowledge could be based on utilization of metadata, exemplified by *tagging* (selecting key words). Every text published on the page should be tagged. Tags would automatically constitute "topics". By searching a topic, e.g. "newspaper", one should access a pool of texts related to the subject, categorized, annotated and arranged according to their relevance or usefulness, based on users' ratings. (Internally, we propose a similar solution for students' FAQs.)

We would also like to develop project management tools allowing students to participate in various school efforts, e.g. *half-bakery*, an ideas bank, where users can share partly developed inventions, or tools for collective translation of foreign texts. As of 2010 the faculty launched the Atteliér school agency to produce and supply media content for external subjects (some of them commercial). The agency depends on students' engagement; however, we feel that their participation is motivated poorly at the moment. Students won't earn real money for their work, since the agency services are either much cheaper than commercial or they are simply bartered. (Anyway, to promise students "real money" would mean to enter market competition full-time. Public universities aren't going to become companies any time soon. We tend to think it should stay so.)

The page would not only make students' work visible and presentable, it would also motivate them by other benefits, e.g. virtual currency, money that students would be able to "earn" for activities documented on the site (like participating on agency's assignments). The currency wouldn't have just a symbolic value, since it would be exchangeable for products and services – related or non-related to the school – at the online market (*market.fmk.sk*). The basic virtual value could be attached to any kind of outputs one produces – be it the media content, comments, ratings or editorial work. Additional value could be gained from user reputation (so called *karma*), combining quantity and quality of user's contribution (robust karma).[8] The market could host virtual auctions for plethora of items, like concert tickets, and (paid entry) competitions with virtual financial rewards for the winners. Students would be also able to organize games with "monetary" rewards themselves. Selected sections, features or functions of the site would be accessible only for "charge" in virtual credits.

[8] see FARMER, R. – GLASS, B.: *On Karma: Top-line Lessons on User Reputation Design*. http://buildingreputation.com/writings/2010/02/on_karma.html

3. STREAM YOURSELF: LEARNING BY MAKING

As we already mentioned, every user will have an opportunity to make his presence being felt, at least by creating and updating his own profile. This profile is not meant as an encompassing representation of one's own life. It should represent its owner as a university student. It should make clear his learning and professional occupations to help him identify with his school both as an institution and as people who populate it. Students will gain a space to publish, share their study-related content, and by virtue of commenting and rating, they will gain more feedback than they can get now. (As post-graduates we remember very well frustration of preparing a paper on an interesting subject, eventually read by a lecturer and no one else.) The individual profile with assorted works, lists of activities and acknowledgements can serve as a curriculum vitae, or should be applicable as a part of one.

The page will also enable participation in creative/interest groups in a partly autonomous form (*group.fmk.sk*), to help students better express and pursue their special interests and to enhance a communal feeling of the whole experience. On a similar note, the page should be associated (to the point of merge) with the faculty's live and on demand streaming service, based on the Internet student radio, called aetter. As we suggested elsewhere,[9] live streaming can integrate functions of radio, television, news portal and social network. Streaming could also be used to provide distance learning lectures and consultations. Every person affiliated with the school would get an instant access to broadcasting almost any form of expression.

CONCLUSION

Technologists are quick to suggest that "*we underestimate the power of our tools to shape our minds*" (Kelly). Maybe, but we shouldn't underestimate the power of our minds to shape our tools neither. We can't deliver a comprehensive conclusion at the time, since our argument is propositional: we want to make the *fmk.sk* platform work. Our theoretical assumptions make it clear that the platform could work if it enables more effective communication inside and outside the university, promotes collaboration between students, teachers and staff members and incites their individual creativity. In this sense, every newly added and developing feature or function of the site will be an index of how the theory works in practice. It

[9] KABÁT, M. – KOVALČÍK, J.: *Možnosti streamingu v prostredí vysokoškolských (študentských) médií*. (not published)

may not work at all, commencing a further investigation of theoretical cornerstones.

Technologists are also quick to assert that "new socialists" or "neo-progressives" are "extremely pragmatic" fellows. We appeal to pragmatism insofar as we take the academic social network for necessity in our time and space. We also hope (quite pragmatically) that the platform development itself will be a social and collaborative endeavour, in perhaps just another instance of cyber-utopian *"naive belief in the emancipatory nature of online communication that rests on a stubborn refusal to acknowledge its downside*."[10] It is safe but irresponsible to theorize about upsides and downsides of online communication in the university without trying it for ourselves.

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[10] Morozov, E.: *The Net Delusion*. PublicAffairs, New York, 2011, pp. xiii (Introduction).

DEVELOPING POSITIVE SOCIAL ATTITUDES IN CHILDREN AND ADOLESCENTS IN THE EDUCATION SYSTEM E-LEARNING

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Abstract*:* *Twenty-first Century Society Must Acquire a high ethical and moral values and sensitivity to others That electronic His creations to not render to the Temptations of evil and destruction of His Humanity. This is to help him ethics and art, shaping the sense of beauty and goodness of others. Their sciences are developing social values, cultural, aesthetic, creative, and the identity of the individual. They are the process of transforming lives through the expansion of our consciousness, shaping our disposal, but contact with other people and share the culture with Them and depth of life That comes from the beauty and human warmth, Because man to His Life looking for the light, beauty, goodness and truth.*

Keywords: children, learning, social attitudes, mass media.

1. DEFINITION AND CLASSIFICATION OF SOCIAL ATTITUDES AND THE FACTORS INFLUENCING THEIR FORMATION

The term social attitude is understood in different ways. Kozlowski says that: "The term is usually understood as the attitude of a relatively permanent system of beliefs, emotions and feelings and behavior of individuals in relation to the object (person, object, idea). The attitude when we say: the individual becomes aware of the existence of a certain object, person or idea, while communing with the object formed some beliefs about it. Contacts with the object lead not only to produce convictions, but also to respond emotionally, characterized by a kind of feeling excited by the object

(positive, negative) and their strength, emotional attitude, emotional prompts the individual to a specific behavior in relation to the object, expressed in tendency to avoid, or aggression, or closer" (Kozłowski 2005).

According to H. Larkowej term attitude. is an acquired disposition to respond (behave) in a characteristic way to certain stimuli, which are the objects, people, events " (Larkowa 91).

T. Tomaszewski (1967) says that: when we talk about someone's attitude toward an issue, then we usually have in mind: first - his knowledge and beliefs about, and secondly - its characteristics and relationship to emotional matters, third - that which is able to do about it.

Social attitudes are very complex. According to H. Larkowej: "They are aspects of cognitive, emotional and motivational. Intellectual component consists of comparing the attitudes of individuals with established standards, practices and making quantifiable assessment. Emotional component is positive or negative sign, combined with pleasant or unpleasant experiences. Motivational component directs our behavior "to" or "from" object approach. The posture can be favorable ("a"), hostile ("cons") or neutral. They may also be ambivalent attitude, divalent - positive and negative (Larkowa 1991).

Social attitudes are influenced by various socio-cultural factors. According to T. Mądrzyckiego are the following factors: the impact of culture, the impact of basic social groups, knowledge, gender and age. The culture includes some kind of statements about reality - or the scientifically proven beliefs and myths - and the ideologies, social norms, styles, behaviors, patterns of personal information, etc. All these elements of culture influence the attitudes of its participants. By creating your own attitude, the unit is based in the greater or lesser extent on social values, which are the basic building blocks of the formation of attitudes. Factors influencing attitudes include the impact of basic social groups. In any social environment there are certain social norms, habits, customs, beliefs, educational practices, distributed beliefs, which are often prejudices and directly influence the shaping of attitudes.

One of the main social groups influencing the attitudes of the family. Parents have a significant impact on shaping attitudes and behavior of the child because satisfy his needs. Parents have the appropriate social experience, knowledge and intellectual maturity. Family, therefore, provide child social values, moral standards, customs, religious beliefs and different social stereotypes, thus shaping his attitudes.. An important factor influencing the formation of attitudes is knowledge. According to T. Mądrzyckiego "promotes the formation of knowledge few stereotypical attitudes, prejudices

and superstitions of the liquidation, the formation of tolerance and attitudes relevant to reality. It can be argued that prejudices, stereotypes, irrational beliefs are mostly prevalent in societies with a low degree of knowledge." Knowledge is so important in shaping attitudes (Mądrzycki 1997:112).

Another factor influencing the formation of attitudes is sex. "With sex linked to specific properties of anatomical, physiological and psychological. It can be assumed that the characteristic features of each sex body building, body functions and the pace of development affect the psychological differences in the properties. "It should be noted that the sex linked to historically established patterns of personal, social roles and behaviors that also influence the shaping of attitudes. So the girls are inherently less impulsive, more controlled, are easily influenced by environment, are suggestive and fearful. While boys are characterized by greater dynamism, impulsivity, self-confidence, nonconformity and a tendency to aggression. The above-mentioned personality traits of both sexes are of great importance and influence on attitudes. Factors that significantly shape the nature of social attitudes may also include age .. Speaking of age as a factor of development of attitudes, we mean taking place in the life of the individual impact of changes in the external environment and internal changes." The role of age in revealing the attitudes associated with the change posed in front of the unit tasks, social roles and their relations with other individuals and social groups. With age, changes direction and type of attitudes (Mądrzycki 1997: 113).

2. THE HISTORICAL ASPECT OF BEAUTY AND ITS VALUE IN THE SHAPING OF SOCIAL ATTITUDES

In ancient Greece the concept of beauty has been associated primarily with the idea of goodness, spirituality, morality, think and reason, equated it with perfection. This view has for centuries practiced Pythagoreans him, saying that beauty is the perfect structure and a positive aesthetic feature of being resulting from the conduct of proportion, harmony of colors, sounds, adequacy, moderation and usability (Tatarkiewicz 1976: 97).

The meaning of Aristotle's beauty is all that evokes positive emotions, while Plato believed that true beauty is extra physical and is a good thing as great as the truth. In the fifth century BC Sophists denial of the objectivity of the perception of that value and to restrict the concept to what is perceived as pleasant by the sense of sight and hearing. Theory of the Stoics were both close and some writers who lived during the Enlightenment. For the period of

the Renaissance period falls reflections on perfection and beauty of the works of individual artists (Tatarkiewicz 1959).

Immanuel Kant believed that the beautiful is what pleases universally, unconditionally and immediately. After the eighteenth century theory which says that beauty lies in the proportions and consistency of, ceased to apply (Grzelinski 2001).

Currently it is believed that beautiful patterns are not constant, are specific to cultural circles ion and the period in which they arose. This is, among others. because they often artists tried to give his own definition of beauty, independent of the previous canons. Thus, the beauty seen by the artist is seen as subjective and dependent on taste or preference (Burke 1968).

Today it is recognized that there is a perfect beauty, spiritual, moral, natural, physical, objective and subjective. This notion is strongly associated with the theory of aesthetics, truth and goodness. Music is one of the fine arts. Accompanied by a man throughout his life from birth until death at his rest, work, happy and sad moments life. There is no art more adherent to the life of life of individuals and societies, like music. This art has a huge impact on humans. Music is the only one of the pieces can thanks to its communicative and direct effects on the physiology and the sphere our emotional psyche. Music is a treasure of past centuries, the cultural heritage of all generations. It is an art that most inclined to dream (Stojak 2007: 48).

Music for a man may fulfill the role of education, educational, but also therapeutic (Pyka 1977). In this process accounts for the particular role of the school because, as Daniel Goleman says (..) more and more children in the family is not a support in difficult situations. The school should therefore not only provide an adequate education in specific fields of knowledge, but also to prepare their students to self-brave and productive life in society, learn how to overcome various difficulties and skill experience failure, how to live in harmony with each other and the environment, to feel joy, optimism and sense of his or her work done. This process Goleman describes as emotional systematic education in which pupils develop the appropriate emotional and social competence (Goleman 1997: 417).

From the standpoint of aesthetics, music shapes sensitivity to beauty, develops the imagination, satisfy the need for expression, teaches independent thinking and aesthetic evaluation. Positively affect the intellectual development of children. In the development process of feeling and sensibility music meets the needs of the inner life, brings excitement and

new aesthetic experience for the child who embellish his world (Szuman 1975).

The health education aspect of music and movement are a source of joy and relaxation, static electricity and physical development. Movement with music as a means of therapy is known and appreciated by physicians and psychologists. The main task of music education is the next music education, is also shaping the personality of students and prepare them for participation in culture and society (Jakubiec 2006: 78).

Musical education and the arts plays a significant role in the development of social values, cultural, aesthetic, creative, and individual identity. Education Music is the process of transforming lives through the expansion of our consciousness, shaping our disposal, the ability of contact with other people and share with them being culture (Eisner 2002: 107).

It is important to the student through education in music, he saw self-development tool: a critical analysis of cultural events, historical and social. In the cultural sphere, the music is accompanied by all the major events of cultural, religious ceremonies, scientific academies, which gives an image of beauty, reflection, meditation, or joy, etc (Choi Caruso 2004).

The music for therapeutic purposes has a calming effect, can be used to remove various disorders in the child's development such as neuroses, fears, complexes, facilitating contacts between people, learning the correct ways of expressing feelings, etc. Classes of rhythm and music satisfy. The natural needs of the child, are associated with the fun and make a lot of joy to your child (Dalcroze 1965).

The wealth of forms of music and dance influences on the human body provides ample opportunities for its use in pedagogical practice, and specifically can be extremely valuable in the rehabilitation of children and youth (Gromek 1984: 424). With the music of a young man unloads his blocked emotions are released from tension and frustration; achieves harmony of body and mind (Martin 1993).

3. BODY LANGUAGE AS A FORM OF EXPRESSING THE BEAUTY OF YOUTH IN SOCIAL LIFE

Language movement or "body language" ("body") is about 70% of interpersonal communication - communication between people with each other. Communication skills to determine the relationship between humans' impact on self-identity. The lack of such skills can lead to feelings of

loneliness, disappointment and insecurity. Body language is an individual matter, shaped in unique, specific conditions of life for each of us from earliest childhood (Coleman 1994).

Body language is expressed through eye contact, posture, finding the presence of a close person, without violating the private space, warm tone of voice, speaking clearly, without a whisper, shout. A particular kind of psychological conflict is located in the body of a child educated in the habit of abstaining from emotional expression, which is evident in various forms of feelings children express their feelings through the launch of muscle activity. When a child is afraid to express some feeling, secures a certain group of muscles. This suppression of feelings through the creation of states in the body muscle tension, often leads to neurotic disorders that lead to psychological dysfunction (Lambert 1999).

In every child's experience is reflected in gesture, movement, and his voice, which is a dynamic whole development of his personality. Child's movement comes from elementary rhythmic stimuli, which involve the processing of music and emotion activation, which determines the auditory-motor synchronization. As stated, even a seemingly motionless man shows while listening to music muscle activity (Pease 1992).

The music is so rhythm control. One result of this type of activity involved in the processing of music is found in all cultures of music rhythmic abduction phenomenon (called *rhythmic entrainment*) involving the coordinated ion and rhythmic movements of the whole body caused by the processing of music, with a limit of conscious processing of stimuli, (Clayton 2004: 75).

Music defines and determines the common phenomena in music and movement, such as space, time, form, expression. The child dance moves to the music: fast, slow, speeding up and slowing down, illustrates the movement of all the changes of pace, body language illustrates the different musical and rhythmic motifs of varying duration. The dynamics of movement in the "body language" is very rich and is a variable intensity, transition from soft movements, swing, rounded to the strong, strength, tense, angular (Adamska 2009: 98). Music simple. matched to the child's psyche. initially triggers the spontaneous impulses of movement. which, through "body language" express the joy, freedom and relaxation. By supporting the role of music in a child increases the penetration power, sensitivity of feeling, the ability to assimilate and organize specific impressions and experiences and giving them appropriate forms of motor (Kloepel: 1995).

Child gains knowledge through the movement of your body. Meets action space, adapts its activity to the situation. Observing the children we see showing their feelings in facial expression, gesture and movement. The child learns through his activity your abilities. Knows his own body as a means of expressing the will, feelings, fantasies. Dance not only makes the child susceptible to his own attitude, activates the senses, but also connects to the behavior towards other children. A child in a dance motor must make contact with other children, interact, thus becomes the member of the community, acting together and compassionate. Gaining confidence. ceases to be self-centered, it becomes a communicative and open. Increases his sense of self-confidence. confidence in myself. This is particularly important for a shy child. It is also very satisfying one of the most important needs of the child - to be noticed (Kuźmińmska 1995).

Practice leads to improvement of motor function impaired. for example in children with impaired mobility. Appropriate music is treated as a multidimensional and non-verbal means of communication as a means of expressing feelings is not yet capable of being expressed. Used to communicate with children between them, also provides an opportunity to share your experiences with others, and thus exercises in social interaction. Music leads the child to master the external world through the awakening of his imagination, which in young children is a game of imagination and makes children often confuse fantasy with reality (Adamski 2003: 135)

"Body language" through dance to better understand children with behavioral and timid children, and expands knowledge about the causes of these disorders. Creating a situation whereby children gain self-esteem and confidence is the most important task of the teacher. The teacher should see to it that the body language he was decorated with the beauty of movement, a creation of his own compositions movement to facilitate the readability of interpersonal communication, and show the distinction, beauty expressed in the form of body movement and cultural behavior, what children and young people today really missing (Adamski, Adamska 2009: 128)

4. THE ETHOS OF CHIVALRY AS A WAY TO RAISE THE BEAUTY OF LIFE AND HUMAN DIGNITY

"Ethos" in Greek means habit, custom. The ethos of chivalry is therefore a set of customs, norms, values, rules of conduct make up the lifestyle and character of knights. Knight era began in the tenth century and lasted until the end of the fifteenth century (Osowska 2000: 30).

Knight in those days had to be characterized not only the nobility but also the beauty, character man should radiate strength, courage, beautiful good looks and bravery. It was believed that the status of knight has the same dimension appointment as state minister, so the accolade was a religious ceremony. Squire night before the ceremony fit to spend with his companions in prayer, then cleansed the whole, symbolizing the cleansing of sins. In the morning he dressed in a white shirt, a gold tunic and red cloak, then beginning to accolade (Clark 1991: 32).

The Middle Ages was a period in which developed numerous role models, one of them are the knights who had a special social status. Their behavior was mainly based on the code of chivalry, in which first place was God-Honor-Fatherland. They were righteous noble and brave. They posed as a model to follow. Knight must be truthful, kind, loyal and attentive, even during the war. Law of war spoke about how to behave in battle. Knight was not allowed to mistreat the prisoners, to allow this to hostile army soldier died from wounds received no help. You could not kill another when he fell from his horse. We were not allowed to attack an opponent who had no weapons with him. "Ethos also did not allow an attack in the back" (Adamski, Chmiel, Syta 1981: 34).

Currently, the chivalry survived only a few elements so necessary for today's world. We can not respect national symbols, what we can talk about sacrifice lives for the fatherland, as did Roland's novel "The Song of Roland." God is forgotten today, in the midst of daily duties is not time for him, runs away from problems in alcohol, entertainment. No moment of reflection on his life and prayer to God, and yet he is so very necessary to man. He remained honor, no doubt, once the word knight was more important than any oath. Breaking it was tantamount to losing their dignity and respect. Modern man has not worked out the ideal of honor. The word has no value of truth, falsehood and evil, is the basic thread of our lives.

5. GOOD AND ITS DIMENSION IN SHAPING A POSITIVE ATTITUDE OF SOCIAL

Man has lost the sense of being good to others, and thus is also not good for himself, of whom do not realize. Hence, taking all his suffering. As long as man does not understand that he himself pays to be good for others, yet he will be bad to live on Earth. Today the most commonly discussed issues faced by parents, teachers and educators, this aggression. Violence, rape and cruelty occur more frequently among children and adolescents, so the

question arises, where is the ethos of chivalry and knights?. These principles are not taught to young people. Education should strongly reflect on some educational programs that would teach the culture of chivalry, with high relevance to their lives and social mores..

Images containing malicious content in films, computer games stimulate 'dormant' tendencies to accept violence and immoral acts. Carries, is another threat, which is the phenomenon of emotional anesthesia, which is socially most dangerous consequence of acts of aggression on screen. In addition to the absolute worship of death and violence in many games, we find patterns of anti-cultural, namely the satanic themes. The symbolism of them is difficult to understand by young people, but woven into the fairy-tale story line may be embedded deep in the subconscious. Another threat are the pervert minds of young people in the pornographic computer games. Their realism, authenticity and a wide range makes this entertainment is very popular (Juszczyk 2000: 134).

In addition to emotional influence, consider the impact on physical and mental health. Wrong and contact with the computer for hours a concern especially among ophthalmologists, neurologists and orthopedists. The computer sending harmful radiation adversely affects the eyes, leading to persistent disease. Moreover, computer games are replacing a healthy lifestyle, sports, hiking and outdoor fun. This in turn contributes to various diseases of the skeletal system and cardiovascular system. Most, however, talk about addiction to games, putting them on par with drug addiction, alcoholism and gambling (Adamski 2005: 89).

This applies mainly to children and youth, as the group most vulnerable to takeover patterns promoted by the medium of electronic games are. The child often loses contact with the community and is in contradiction with the principle of harmonious development of personality, which in turn may lead to its distortion, it can become a source of fears, neuroses and negative attitudes. Condemnation of all programs, and even the computer itself makes no sense. It is after all a tool without which it is difficult to imagine today's world, so young people should learn to celebrate with him reasonably and rationally use it. As parents, let us control over how you use your computer for a child. Games, programs and the Internet itself must be appropriate to the age and interests of the child. When buying a new program to be interested in what age it is intended and whether or not your child will bring stress. In this way avoid many dangers, which, after so many carries with it the modern world (Adamski 2005: 95).

It would seem that the man on the one hand is brilliant, as evidenced by his great discovery, on the other hand - with all its flawed defects, which prevent him, to achieve unity with other people, can not create a perfect social system, which could feel calm and safe. This is not so much about creating quite a perfect system, but at least much more perfect than that which is right now.

In an atmosphere of warmth and affection the child grows in the belief that in every situation found in the arms of his mother or his father's aid, shelter and understanding, even if his conduct does not find approval. Childhood lived happily leaves a deep impression on the child's personality and is his most effective remedy for discouragement, failures and weaknesses of everyday life. Good memories, happy moments spent in the close surroundings also make it that children will retain for life emotional contact with home and are always happy to him coming back, and your house will create a future similar to that which grew themselves.

6. PEDAGOGY AT THE THRESHOLD OF THE TWENTY-FIRST CENTURY AND ITS ROLE IN SHAPING POSITIVE SOCIAL ATTITUDES AMONG YOUNG PEOPLE

At the heart of the idea of "New Education" is the concern for the multi-faceted educational value. Man creates art. So it enriches their lives and shapes our own society. Art is a product of individual creativity, sensitivity and human imagining. It is important to see in her own development tool: a critical analysis of cultural events, historical and social as well as a potential agent in social transformation. Education through art school should be included in its object and purpose is to develop in students the creative disposal, enabling them to enjoy the music, dance, singing, artistic creativity, as well as in cooperation in the formulation of positive personality traits such as creativity, imagination , creativity, imagination, indepen-dence, resourcefulness, discipline, willingness to maintain social ties, emotional sensitivity, need for order, and the high rate of morality (Adamska, Adamski 2009: 131).

Teaching integration in schools requires a new development, especially in the early grades, because the current educational system often becomes a "producer" of mental dysfunction in children. Too much material, not enough time for the child's creativity, abstract transfer of information from the teacher and teaching materials, educational differences between teaching in a kindergarten and school. cause the child's frustration and stress. This mental

disharmony in a child expresses a lack of concentration, rebellion, impaired synthesis and analysis of the material above-mediocre mobility, verbal and physical aggression, disturbed daily rhythm. The resulting psychological dysfunction can be corrected by the art therapy may be adjusted, within which may include: music therapy, chore therapy, psychodra-ma, film and plastic arts: painting, sculpture, graphic art, etc. Art therapy is considered not only as a treatment to treat, but also as an important element in the proceedings and parental education. Attribute of music, dance, movement and speech is the beauty inherent in them. The value of beauty in art helps overcoming shyness, anxiety, and sometimes even pain. Nice text encourages speech, singing and dancing and fun compositions encourage movement. The beauty of awakening desire promotes cognitive and absorption values (Adamski 2009: 239).

Music and movement produce their products, among others a sense of rhythm, musical memory, thinking, attention, spatial imagination, aesthetic movement, musical sensibility. Particularly noteworthy is the theater here, winning many elements of art such as literature, acting, stage architecture, music, dance. Theatre uses the word, sound, visual art, movement. That formed a whole makes the recipient of a play develops their imagination, takes a moment in the world of fiction, which gives the viewer forget the worries of everyday life, relax, or become a driving force for positive action. Theatre satisfies the needs and raise the intellectual, expressive, aesthetic, emotional, cultural and human. You should also mention choreo therapy. In dance, we can reduce negative emotions, stress and tension of body and mind. Dance reduces anxiety, improves concentration, reduces tension psychophysical discharges excess energy and aggression, improves motor coordination and endurance, increases self-esteem and preferably changes the behavior. The harmony of body and mind helps to know yourself and your emotions and learn to communicate with others. Each piece of positive forms of human personality (Adamski 2010).

The movement is an indispensable means of moral education, aesthetic and social. Accompanies man from birth to death, revealing themselves in various forms of its activity. In ontogenesis movement is recognized as a major factor biological influences on development and physical fitness as well as elementary and indispensable foundation of physical and mental health of man. From a biological point of view, lack of exercise can lead to pathology in the operation of neuro-endocrine, metabolic disorders, muscle and tissue atrophy, osteoporosis, reduced lung capacity and ventilation, this also has a huge impact on the psyche of the child, is the cause of stress, anxiety and inhibitions. Such children often lose faith in their own strength and

capabilities, they close in on ourselves, losing touch with its surround-dings (Adamski 2009: 196).

Pedagogy and psychology of XXI century must take into account that we live in an era of post-modernist, where pluralism and multiplicity is a source of anxiety for many people, but the phenomenon of multiplicity and diversity of cultures, peoples, ideas, attitudes towards other men will be present every day. Psychology and education must become more open to a man should devote much space on prevention and education through art widely understood.

Art for children is not the same as for an adult. For the average man's art is usually associated with the field of aesthetics and beauty. Art for children is a means of expression, becomes for him an expression of thoughts and experiences. Aesthetic experience and the experience of child psychology trigger mechanisms, activate the dormant power and brilliance of children's lives. Through art, some dispositions of the student, his sensitivity, imagination, personal ability to respond to the stimuli of the outside world are revealed in creating the atmosphere of participation in culture.

Art provides children of large capacity, it develops comprehensively, because education can not be confined to the areas referred to in advance by the educational system, which emphasizes particularly on gaining good grades, going from class to class, pass the exam, and at the same ignores the topic of development of art, etc. Such a man is often extremely intelligent, but often can not use their intelligence in their social life.

Ability to recognize problems, the perception of the shape of interiorization and restru-cturing and the search for social competence, a performance that you can not learn in school and at home without the presence of arts and culture.

It is concluded that the most important goal in education and upbringing is acquisition of such axiological values as:

- developing a good and noble character of the disciple. Building a relationship with the truth world and with himself and another man.
- building on Christian charity and foundations: the ability to create happy relationships in the family,
- developing a compassionate heart for self, others and the surrounding nature.
- learning helpfulness of chivalry and selflessness.

- teaching of honesty, morality, diligence and time keeping their word.
- non-violence-not inflict pain, no beings, indirectly or directly.
- learning to live in harmony, emotional control, gentle sophistication, ability to meditation and other forms of relaxation,
- ability to cope with stress and demands posed by life. Life form an important in the adaptation of depth helps better understand the social and human problems,
- the teacher should be an example of moral and ethical values and a model for follow .

Today we live in a postmodern world and forget about these values. Inventions and Technology is addictive and enslaves. Surrounds a man convinced of his indispensability. Any loss of access to the inventions will be a disaster and regret the difficult to bear. Man wants to bring as many gadgets, because it is convinced that life without them would lose flavor. The very thought that the cell stops and will not be able to call anyone, is a vision so terrifying as the end of the world. The technique imposes a terrible visions of loneliness, loss and oppression, overwhelming consciousness of a continuous struggle with the pressures and expectations that need to fulfill in society (Adamski 2008).

The modern world can not imagine life without mass media, which are called the mass media or means of mass communication. These are television, radio, newspaper, Internet, advertising, magazines, etc. In everyday life we meet with them, listening to the radio in the car, at home, television, the Internet at school, etc. Mass media play a huge role in the life of every human being. Are primarily important source of information that can be used anytime, day or night, regardless of where we are (Dylak 1998).

The services of television, newspapers or use the Internet today, almost every one of us, means media are used in the entertainment world, business, science. They are also universal and socially approved way of spending free time. Mass media are an indispensable tool of some institutions at work. However, most people are not aware of the destructive impact of mass media on young people's mental life. Mass media have a negative impact on the psyche of children and youth who spend an enormous amount of time watching television or surfing the Internet. Harmful effects of mass media is to (Kirwil 1995: 34).

The fixation of young people aggressive patterns of behavior by activation of negative emotions and learning of young people insensitivity to violence

occurring in thei enviro-nment, which is regarded by them as a normal social phenomenon (Aronson 1995).

– reversing the attention of young people and children from other forms of entertainment, rather than spending time on outdoors or to instruct you, they wasted almost the whole day sitting in front of such television or the Internet;
- causing physical health problems, such as eye disease, curvature of the spine;
- contribute to the social isolation of young people who withdraw from contacts social, and this leads to anxiety and neuroses (Zebrowski 2001).

Times go, that good manners will teach us educators and teachers in Nepal among the local population where there is a habit that people everywhere are warmly welcome and enter the house, feeling almost instantly at home, greet each other when they pass on the road. They talk always with a smile and welcome share what they have (Pawlikowska 2010: 84).

7. ONLINE SUPPORT FOR LEARNING POSITIVE SOCIAL ATTITUDES AMONG CHILDREN AND YOUTH

Polish Creating an information society is the result of influence of three factors: the leading global trends, European integration processes and the internal transformation that occurs in the country in the 90s of last century (Krzysztofek 1997: 64).

Today we experience every step of having to use their own knowledge of information technology for the implementation of hundreds of daily activities (eg, computer-based banking, shopping via the Internet, medical diagnostics, use, distance education, but also the transmission of cultural topics, positive patterns of behavior that have an influence on the for-mation of good habits, social attitudes, which have a positive effect on social life. Scientific - technical progress, information and computer revolution, more and more advanced techno-logies are the features which characterize the present and to channel future (Jaskuła 1997).

Multimedia information technology, and the companion awareness programs are now a permanent element of the educational process. It's hard not to appreciate a number of proposals that are presented in the trade, becoming in competition with other modes of teaching. A man from the first moments of his life in contact with the achievements of modern technology, shaping the

state of his knowledge and influencing the psychophysical development. Surrounded by children's technology innovations, known today as Internet generation, their actions are interesting and use, and also expect and require the school to apply similar measures in a structured process of teaching-and learning. The current generation of children and young people educated in the schools should be properly prepared for the use of new media of computers, interactive video, electronic databases and computer (Socha 1992: 12), networks, combining many different ways of presenting information (Kędzierska 2002).

School education for centuries associated with the use of various means of education, provide student information for the transformation of reality as well as information about themselves. School education programs should include good manners and noble shaping social attitudes. These programs should be carried out by children, but also by schools. The implementation of these programs should enable the local authorities, but also at ministerial level. Good work should be rewarded, through trips, sports equipment, books, toys and everyday objects. Participation in these programs should also take the mass media through publicity contests and their leadership

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PSYCHOSOCIAL ASPECTS OF DISTANCE LEARNING IN FUTURE TEACHERS' PERCEPTIONS. THE ROLE OF PRIOR EXPERIENCE AND COMPUTER ANXIETY

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Abstract*: Psychosocial aspects of distance learning, such as perceptions, emotions and feelings evoked in context of its tasks and social dynamics are very important not only with regard to the impact on the learner's subjective well-being, but they also account for the student's learning motivations as well as for an effective integration of student activity into curricula. As psychosocial aspects of functioning are recognized as key competencies of all members of society, with the particular regard to teaching professions, distance learning curricula more often include them in the educational goals among the others within their taxonomies. This article seeks to present a study conducted among preservice teachers aiming to explore the psychosocial aspects of distance learning and the impact of students' computer anxiety and prior experience on distance learning evoked feelings, emotions and perceptions as well as attitudes toward Web-based education. Results showed significant relations between computer anxiety and other negative emotions and feelings, especially those connected with phobic responses to technology and its social aspects. Negative relations were observed between computer anxiety and positive affectivity as well as learned resourcefulness and distance learning perceived usefulness. The experienced contact with distance learning was connected with more positive affectivity, better perceptions and greater acceptance of distance learning, and reduced fear response to computer and social Internet use. Therefore, it would be supposed that prior experience could be a psychosocial protective factor operating as a kind of anti-threat buffer within process of attitudes toward computer and Web-based education formation.*

Keywords: distance learning, teacher education, computer anxiety, psychosocial factors of Internet use, emotions, perceptions and attitudes toward distance learning, key competences development.

INTRODUCTION

There is a growing interest among researchers in the psychosocial aspects of distance learning, including personal psychological states and behavior as well as social perceptions and processes, with a focus on factors and determinants, based on a variety of psychological theories and models. The psychosocial aspects of functioning used to be perceived as key competencies of all members of society, with a particular regard to teaching professions. For that reason distance learning curricula more often include them in the key educational goals. Psychosocial aspects of Internet use have been of importance to psychologists and to social and medical support providers also (Aouil 2005; Stefańska-Klar 2010a).

Distance education is a new trend in education that gives a chance to everyone and offers options to learn better under the constructivist approach. (Galusha 1997).The degree of student satisfaction with courses has played an important role in evaluating the effectiveness of distance learning, which could be called "the one of the basic, modern forms of teaching today" (Smyrnova-Trybulska 2010, p.137). Antonio de Reis (2010) formulated four-stages of distance learning development; the first stage before 1970 – when courses were delivered solely by regular mail; the second stage (1970-1980) – the time of Open Universities; the third stage (1980-1990) – teaching and learning based on video cassettes an TV, and the fourth stage (1990-2000) – with e-learning based on interactive computer and multimedia use. However, online learning have been often criticized for its lack of human interaction and, for this reason, there has been an increasing movement toward approaches that would allow students opportunities for both online and offline interaction with their instructors and classmates. (So, Brush 2007).

For the same reason, there is a growing need to pursue studies of the psychosocial aspects of the current forms of distance education, characterized as maximizing the best advantages of face-to-face learning and multiple technologies to deliver learning and referred **to** the third generation of distance learning (the first generation was correspondence education, which utilized a one-way instructional delivery method, including mail, radio, and television, the second - was single technology distance education, such as

computer-based or Web-based learning, and the third generation of the so called blended learning) (So and Brush, op.cit.).

Of great importance are attitudes toward computer and distance learning among preservice teachers, because of transmitting their perceptions and responses to their next work and for playing roles of pupils' models in the future, so there is a growing interest according that theme (Simsek et al. 2010; Teo et al. 2007 Hong and Koh 2002;.Russell and Bradley 1997).

1. REVIEW OF LITERATURE ON COMPUTER ANXIETY AND ITS ROLE IN THE KNOWLEDGE SOCIETY

With the growing presence of computers in society, it becomes obvious that interactions of this kind could have an impact on the psychophysical states and conditions of the user. As regards positive response to computers, people experience and express a variety of emotional reactions such as anger, frustration, desperation, anxiety, or relief. Sometimes these states evolve to be more stable and then they can be called psychological traits. Although the necessity to interact with computers very often evokes in their users a range of mixed feelings such as fear, stress, resistance to learn to use them and lack of control over their work lives, there are persons who are characterized by traits as computer anxiety or technology phobia and respond anticipatable negatively.

As Beckers and Schmidt wrote (2003, p.786), computer anxiety had been described in terms of aversion, of fear of being directly or indirectly involved with computers in the present or in the future (Loyd and Loyd 1985; Smith et al., 1999). It is often accompanied by negative and critical thoughts on one's behavior and by the fear for computer crashes or making gross errors (Nelson, Wiese and Cooper, 1991). Rosen, Sears, and Weil (1993) went on to define the following three different types of computer-anxious individuals: (a) anxious computerphobics who exhibit signs of anxiety reactions (e.g., sweaty palms, heart palpitations, headaches, and so forth) when dealing with computers; (b) cognitive computerphobics who, despite their calm exterior look, are internally fearful of computers and continually think negatively about dealing with computers; and (c) uncomfortable users who are slightly anxious merely because of lack of information about computers (according to Marcoulides et al. 2004, p.311)

Beckers and Schmidt (2001) proposed a model of computer anxiety including six factors: (1) computer literacy (in terms of acquired computer skills), (2) self-efficacy (confidence in one's capabilities to learn to use computers), (3)

physical arousal in the presence of computers (such as sweaty hand palms, shortness of breath), (4) affective feelings towards computers (like and dislike of computers), (5) positive beliefs about the benefits for society of using computers, and (6) negative beliefs about the dehumanizing impact of computers.

With a growing interest in computer anxiety and its impact on computer use and attitudes, a numerous studies were conducted to explore gender, but their findings seem to be contradictory. A number of studies found that women were more computer anxious than men (Chou 2003; Chua, Chen and Wong 1999; Durndell and Haag 2002; Heinssen et al. 1987; Jackson, Ervin, Gardner and Schmitt 2001; Tsai, Lin and Tsai 2001). However, there were many other authors who found no significant differences between the genders as regards computer anxiety (Morris and Morse 2008; Sam, Othman and Nordin 2005; Havelka, Beasley and Broome 2004; Popovich, Gullekson, Roussos 2004; Jackson et al. 2003; Truell and Meggison 2003; North and Noyes 2002; Anthony, Clarke and Anderson 2000; Anderson 1996; McLlroy, Bunting, Tierney and Gordon 2001; Yaghi and Abu-Saba, 1998; Yang, Mohamed and Beyerbach 1999). Similar contradictory findings could be observed as regards computer attitudes (according to Heinssen et al. (1987) it comes to people's feelings about the impact of computers on society and the quality of life, as well as their understanding of computers): Some studies found that males held more positive attitudes than females (North and Noyes 2002; Liaw, 2002), while other researchers found that gender did not differentiate between men and females in their attitudes toward computers (Popovich et al. 2008; Kesici, Sahin and Akturk 2009). All the above gendered patterns of attitudes toward computers were influenced by many factors.

An increasingly popular topic of undertaken research is attitudes toward computer and internet use in distance learning (Isik, Karakis and Güle 2010). Muilenburg and Berge (2005) conducted a survey study seeking to determine what student barriers to online learning were. They found that important barrier factors were: administrative issues, social interaction, learner motivation, academic and technical skills, time and support for studies, cost and internet access, and technical problems. They also considered such barrier factors as gender, age, ethnicity, type of learning institution, online learning skills, effectiveness of online learning, online learning enjoyment, prejudicial treatment in traditional classes and the number of online courses completed. Keller and Cernerud, (2002), in their study involving university students found that gender, prior knowledge of computers and attitude toward new technology influenced acceptance of

distance learning. Their findings were as follows: male students, students with previous knowledge of computers and students with positive attitudes to new technologies held less positive attitudes toward e-learning on campus than other students. The findings also showed that the strategy of implementing the e-learning system at the university was more important in influencing students' perceptions than the background variables.

Many studies focused on relationships between computer anxiety and attitudes, and on their correlation with a lot of different factors. In a number of studies, the relationships between computer anxiety and computer attitudes proved to be negative (Popovich et al. 2008; Sam et al. 2005; Durndell and Haag 2002). Igbaria and Chakrabarti (1990) found that computer anxiety played an important mediating role for computer attitudes and that most of the demographic variables influenced attitudes only indirectly, through their effect on computer anxiety. Moreover, both computer anxiety and attitudes would influence the way students accepted and used computers (Chou and Tsai 2009; Teo 2008; Korobili, Tilikidou and Delistavrou 2006). Brosnan (1998) examined the relationship between computer anxiety and computer performance. The results indicated that computer anxiety was a strong factor of correct responses obtained from databases amount.

Interaction with computers was also found to be influenced by personality, described by the so called Big Five factors as openness, neuroticism and agreeableness, low flexibility and so on. (Anthony et al. 2000; Kurokonda 2007). Dyck, Gee and Smither (1998) found the user's age an important factor capable of changing the structure and determinants of computer anxiety.

Experience of computers was found to be another important factor (Popovich et al. 2008), just as regularity of access, although findings differ. For example, McLlroy et al. (2001) found that the amount of time spent using computer at computing facilities outside the university had no relationship to any of the computer anxiety characteristics, while Teo (2008) found that the students who owned computers at home and spent amount of time in private settings reported a lower level of computer anxiety.

Some studies showed that computer anxiety levels, attitudes and usage mighty be affected by culture and it differentiations (Anthony et al. 2000; Li and Kirkup 2007; Tekinarslan 2008; Weil and Rosen 1995). Li and Kirkup (2007) found that British students were more likely to use computers for study purposes than Chinese students, but Chinese students were more self-confident about their advanced computer skills. Yaghi and Abu-Saba

(1998) in a study addressed to teachers in Lebanese schools, found that the language of teaching seemed to play a role in computer anxiety.

As Macoulides et al. mentioned (2004 p. 311-312), several instruments had been developed to measure computer anxiety and attitudes (Heinssen et al., 1987; Kay, 1993; Loyd and Loyd, 1985; Macoulides, 1989; Rosen, Sears and Weil, 1987). Several researchers have conducted studies using a number of scales to assess their psychometric properties (Arigbabu 2009; Chu and Spires 1991; Dyck, Gee and Smither 1998; Kluever, Lam, Hoffman, Green and Swearingen 1994) with mixed and not always clear results (Arigbabu 2009). Researchers have emphasized the need to clarify the dimensionality of the computer anxiety, attitudes and concepts and to evaluate the validity of the instruments (Bandalos and Benson 1990). In addition, in the view of the constant technological developments, reassessment of existing computer anxiety scales is necessary. There is also a need for cross-cultural examination of the scales, because an instrument developed in one context may not be suitable for another (Macoulides et al., op.cit.)

2. METHODOLOGY OF THE STUDY

The results of many previous researches showed existing relations between students' computer anxiety, experience in computer use as well as previous participation in on-line courses and their current attitudes toward distance learning and its acceptance. Those studies indicated as important correlates: gender, age, psychosocial appraisals of personal and social situation (as interpersonal contacts, social presence, and experienced support) as well as other social, emotional and cultural factors. However, many of those interrelations are not clear and the results of different research as concerning gender differences are unequal. There is also the problem of the lack of studies including the Polish samples. Because, from the psychological point of view, all of the mentioned factors determining the individual's well-being and good adaptation to environmental and life challenges are very important for good health and functioning in the relations with others, we should take them into consideration very seriously. For teachers these would be protective factors against burnout and for their students they could be determinants of their effectiveness and successes in skills and school tasks (Stefańska-Klar 2010b).

Therefore, in the referred study the author sought to answer the following questions:

1. What are the students' (preservice teachers') attitudes towards distance education?

2. Does preservice teachers' previous participation in on-line courses affect significantly their perceptions and acceptance of distance education?

3. Does computer anxiety affect significantly preservice teachers' psychosocial states evoked in distance learning context and their attitudes towards distance education?

The survey method was used in the present study to explore the preservice teachers' perceptions and attitudes towards distance education related with prior on-line learning experience and some level of computer anxiety. A questionnaire was used, which consisted of items describing a range of distance learning psychosocial aspects, such as emotions, feelings, personal and social usefulness and effectiveness, as well as attitudes toward ways and formats of distance learning in university context. Some items described preferred ways of personal computer use. Computer anxiety was measured by CAS, an inventory constructed by Marcoulides (1985) in the Polish translation by the author of this article.

CAS is a scale measuring individuals' perceptions of their anxiety in different situations related to computers, developed and described in a lot of papers by Marcoulides and other authors (e.g., Marcoulides 1989, 1990, 1991; Marcoulides and Wang 1990; Marcoulides et al. 2004, 1995, 1985). CAS contains 20 items that are rated on a 5-point Likert-like scale that reflects the level of anxiety ranging from "None" to "Very much". The range of possible scores is 20 to 100, with higher scores indicating a more self-reported computer anxiety. The instruction used in CAS is as follows: *The items in this questionnaire refer to things and experiences that may cause anxiety or apprehension. For each item, place a check in box 0 under the column that describes how anxious each one makes you at this point of your life. Work quickly, but be sure to consider each item individually*. Here are some examples of CAS items: "Thinking about taking a class in computer" (item 1), "Watching a movie about an intelligent computer" (item 5), "Getting "error" messages from the computer" (item 7), "Thinking about prepackaged (software) programs for a computer" (item 17), "Looking at a high-speed computer printer" (item 20).

Because of some possible impact of cultural specificity on the results in computer anxiety and as the validity of the polish version of CAS has not been researched yet, an exploratory study was carried out without formulating any hypotheses. The participants were 86 students, preservice

teachers, enrolled in MA courses at the Department of Ethnology and Educational Sciences of University of Silesia in the academic year of 2010/2011. All participants were females, aged 21-23 years. They participated in the study voluntarily, fulfilling their paper-pencil questionnaires in class.

To study the influence of prior experience with on-line learning on psychosocial effects in the context of distance education a set of Student t test were conducted for a comparison of experienced and non-experienced samples. To explore the character of attitudes toward distance education one-way analysis of variance for dependent data (MANOVA) was used. To explore the relationship between the variables of computer anxiety and socio-affective aspects of distance learning and attitudes toward different formats of web-based courses, a series of two-ways analysis of variance (MANOVA) was employed. Differences significant at the $p < 0.05$ levels were taken into consideration.

3. THE CHARACTERISTICS OF PRESERVICE TEACHERS' ATTITUDES TOWARD DISTANCE EDUCATION

One way analysis of variance MANOVA showed significant differences in acceptances of range formats of distance learning within study sample ($F(4,420)=20,74$; $p<0,0000$) . The most accepted courses were those offered as blended learning, with rather individually than collectively oriented forms of studies well as limited contacts with course lecturers and tutors (Figures 1-2).

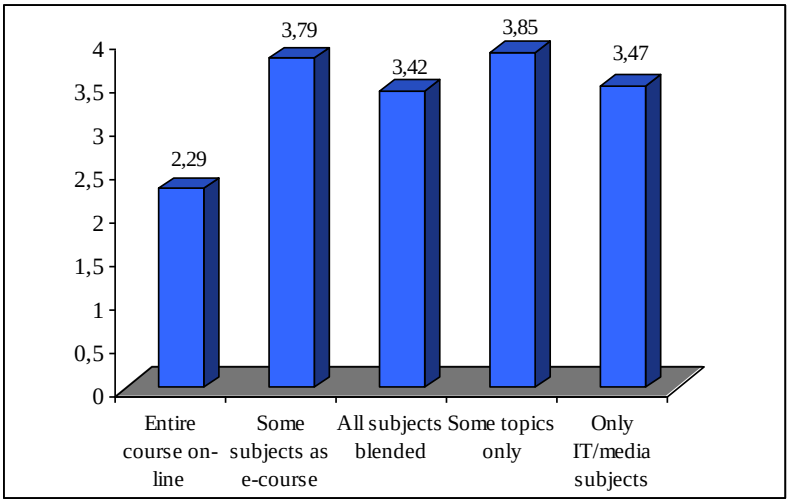

Figure 1. The students' acceptance of distance university education formats

Source: Author's research

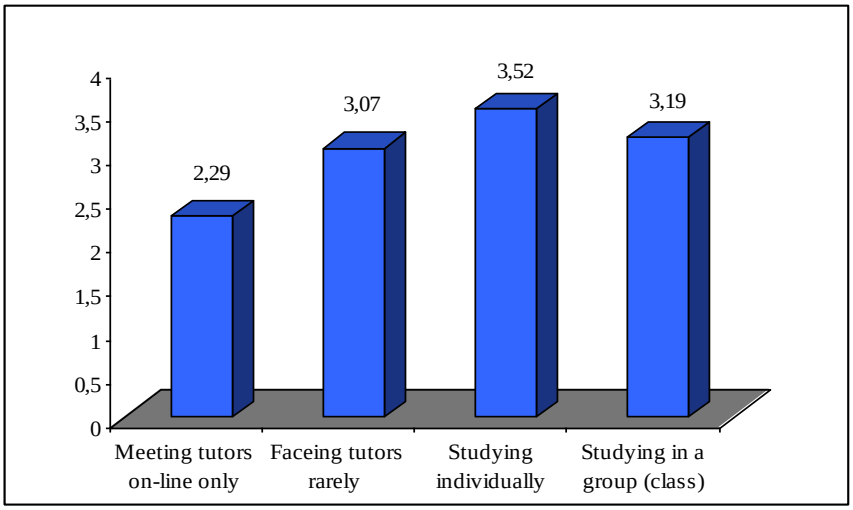

Figure 2. The students' acceptance of different formats of social contacts within distance university education

Source: Author's research

Findings revealed differences between participants' perceptions with regard to distance learning (F (4,420)=3,5; p=0,0079). Positive appraisals and perceptions were predominant, while negative affectivity was lowest scored (Figure 3)

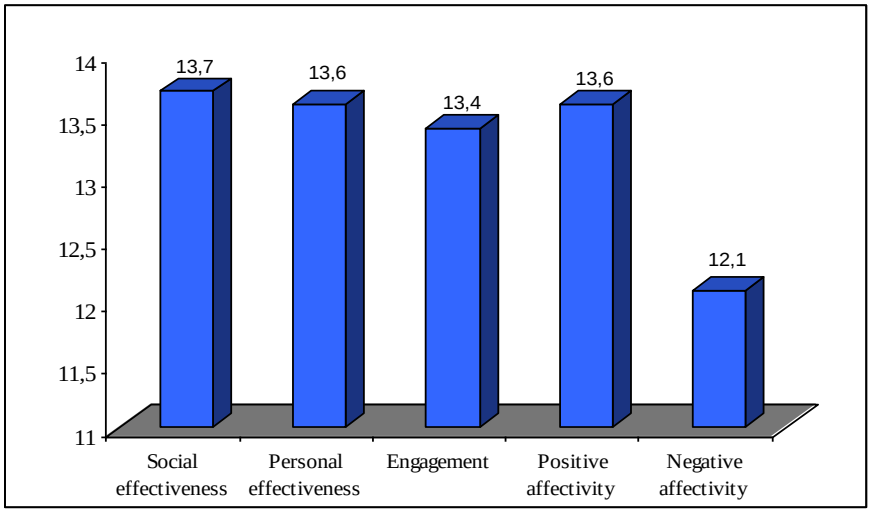

Figure 3. The students' perceptions of psychosocial aspects of personal participating in distance university education

Source: Author's research

4. PREVIOUS PARTICIPATION IN ON-LINE COURSES AND PERCEPTIONS OF DISTANCE-LEARNING

Among all study participants only 20 declared prior experiences with distance education in the formats of blended courses, while 33 participants clearly declared no. The rest of the participants did not mark the data concerning prior distance-learning, so only this part of sample (n=53) was taken into consideration in analysis of prior experience impact on distance-education perceptions.

A set of comparisons were made to find out the character of the differences between prior distance learners and the students who never participated in distance education. Statistical comparisons employed Student t test to examine the differences in the scores of the distance learning perceptions and the acceptance as well as psychosocial aspects of the mentioned participation in web-based forms of university education.

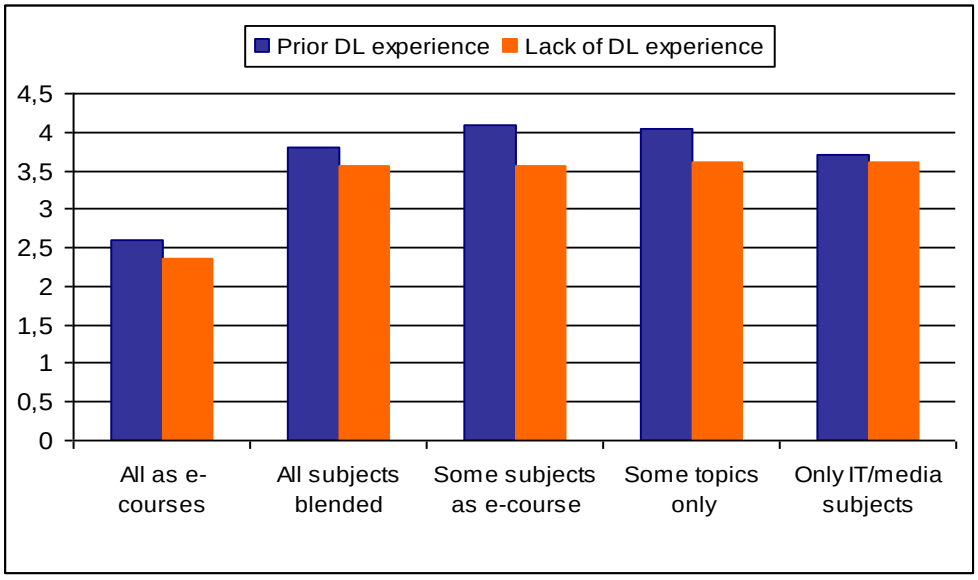

Figure 4. The students' prior participation in on-line courses and acceptance of distance university education

Source: *Author's research*

The students who had participated in some format of distance education at least once, demonstrated statistically higher acceptance of any combination of e-learning delivery methods, than those students, for whom on-line learning was a total novelty (Figure 4). They also used to experience much more positive psychological states as emotions and feelings, as well as other

positive psychosocial outcomes, than students who did not know distance learning from their own personal experience (Figure 5)

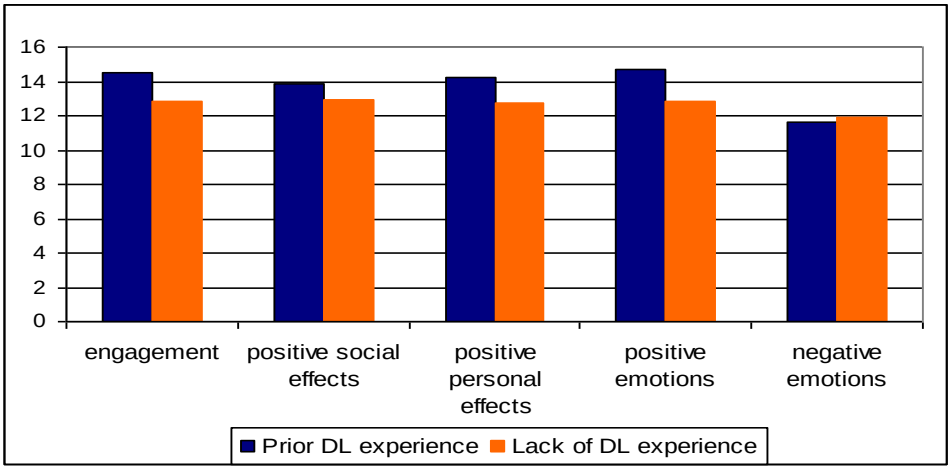

Figure 5. The students' prior participation in on-line courses and perceptions of psychosocial aspects of personal participating in distance university education

Source: Author's research

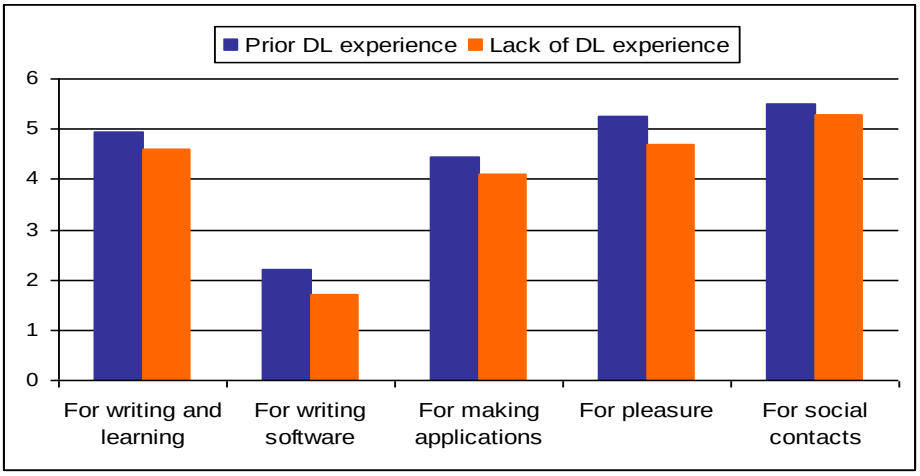

Figure 6. The students' prior participation in on-line courses and their declared purposes of most often computer use

Source: Author's research

Significant differences were found as regards the preferred ways of computer use by prior distance learners and those who never engaged in on-line course (Figure 6). The students who participated in distance courses declared higher

computer usage for all activities taken into consideration. In the other words, they were a more intensive and advanced computer users than their colleagues.

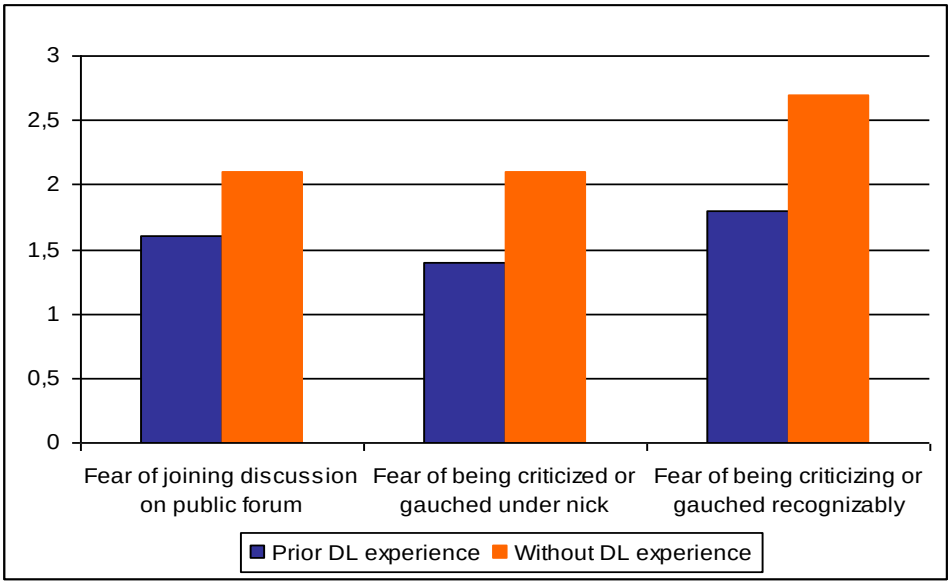

Figure 7. The students' prior participation in on-line courses and fears of internet use in social contexts

Source: Author's research

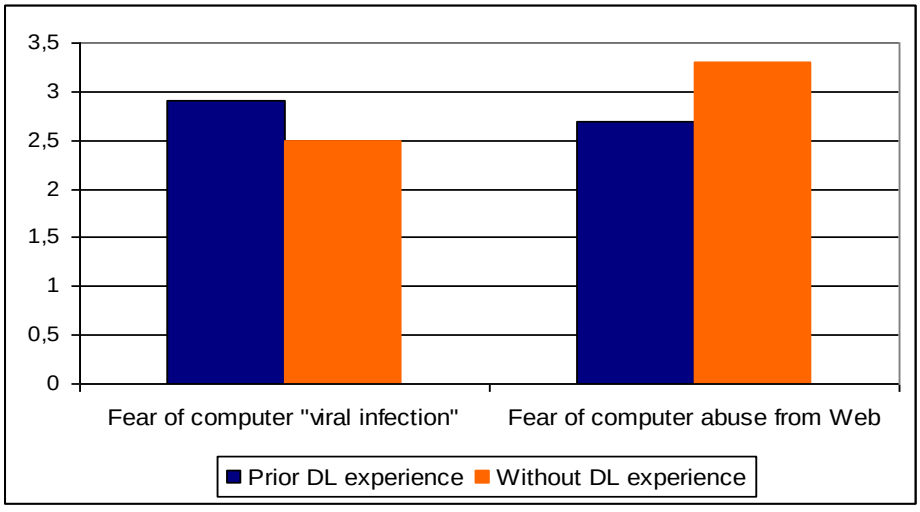

Figure 8. The students' prior participation in on-line courses and specific e-fears

Source: Author's research

An important finding of the reported study was a strong impact of previous experience in distance learning on the level and extent of the fear evoked in computer use and Internet presence and activity (Figures 7-8). As many of other studies have demonstrated, computer and distance learning experience could help to reduce negative feeling and phobic responses connected to computer and Internet use.

5. IMPACT OF STUDENTS' COMPUTER ANXIETY ON COMPUTER USE AND OF ON-LINE LEARNING PERCEPTIONS

To explore the impact of students' computer anxiety on perceptions and attitudes toward distance-learning, the research sample was divided into two groups according to the extent of the CAS results. The cut off criterion was the value of the median score of the computer anxiety (score = 40 points) measured by CAS (See Table 1 and Figure 1 for comparison).

Table 1.

Results of CAS scores in preservice female teachers sample (n=86)

Score	Mean	SD	Minimum	Maximum	Median
Total	41,59	12,48	24	73	40
Note: The total score was the sum of CAS obtained points.					

Source: Author's research

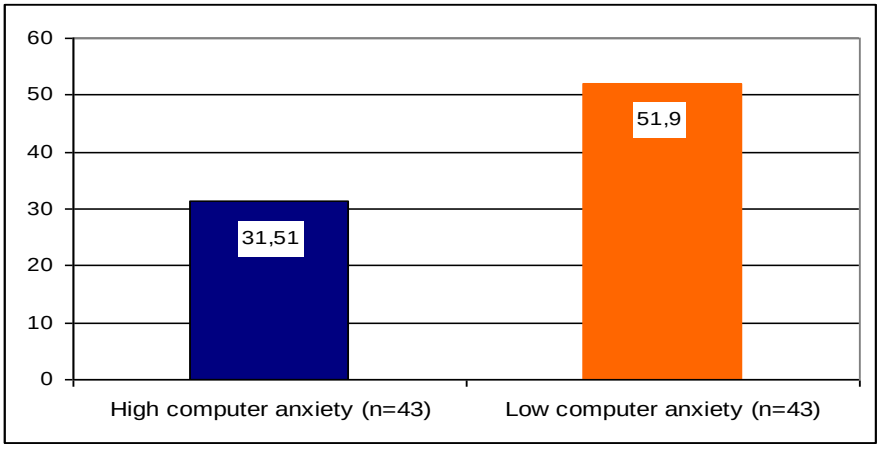

Figure 9. CAS means scores in low and high computer anxiety samples
Source: Author's research

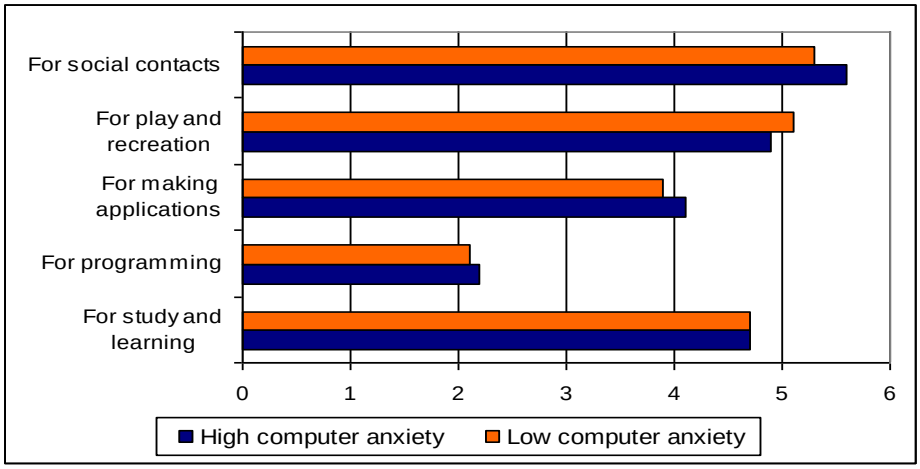

Figure 10. Most frequent computer use by students with high and low computer anxiety

Source: Author's research

Next, the two-way MANOVA analysis was conducted to examine the differences in the scores of the typical ways of computer use by preservice teachers with high and low computer anxiety (Figure 10). The students with high computer anxiety usually used the computer for social contacts and for making applications or programming for educational purposes, while the less computer anxious students used it more often for off-line and on-line play and recreation.

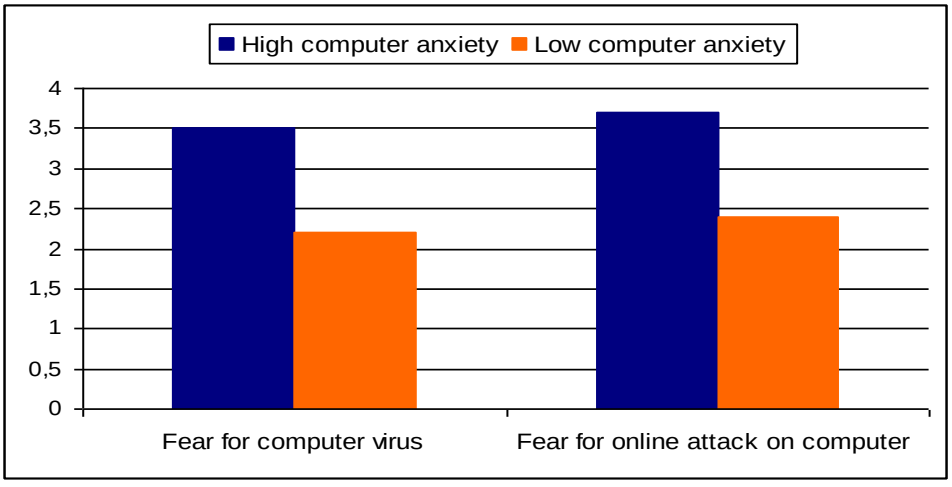

Figure 11 . High and low computer anxiety and e-fears connected with Internet use

Source: *Author's research*

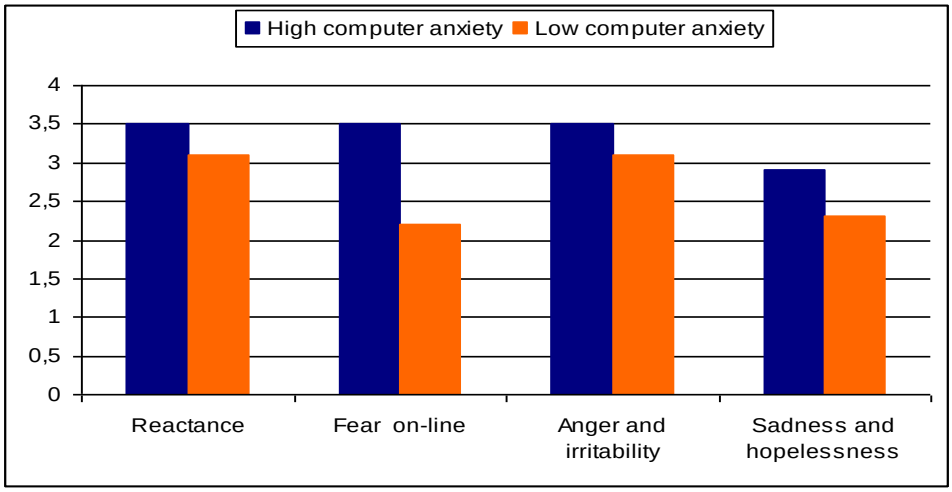

Figure 12. High and low computer anxiety and negative feeling and emotions evoked in distance-learning context

Source: Author's research

There was a significant multivariate *F* result for the effects of negative feeling as reactance or hopelessness as evoked emotions (fear in on-line time, anger and irritability, sadness): $F(1, 336) = 26{,}587$, $p < 0{,}0001$, showing that students characterized by high level of computer anxiety experienced significantly more negative affectivity than low computer anxiety students, when they took under consideration possible use of distance-learning (See Figures 11-12).

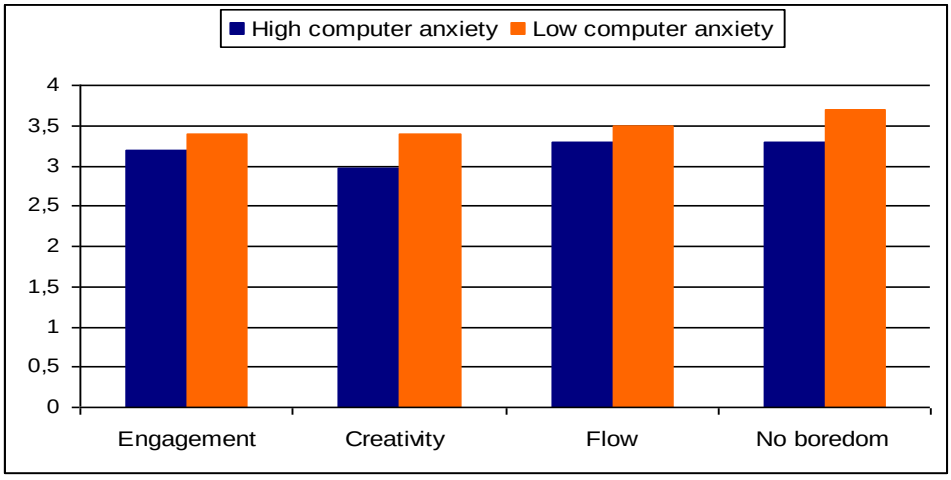

Figure 13. High and low computer anxiety and positive states and feeling evoked in distance-learning context

Source: Author's research

Similarly, the analysis of the positive axis of students' feelings and perceptions showed a negative impact of computer anxiety on the distance learner well-being, although the results proved completely contrary: the higher computer anxiety, the lesser the positive psychological effects as states and feelings included in the so called learned resourcefulness and psychological and behavioral effectiveness as well as basic positive emotions. In conclusion, all of those which concerned personal well-being and quality of life (illustrated by Figures 13-15), were significantly higher in the preservice teachers who demonstrated low or lack of computer anxiety.

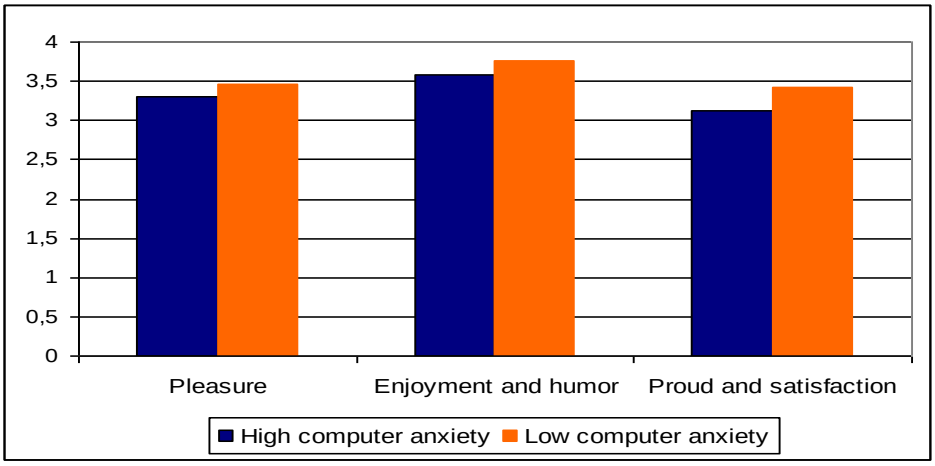

Figure 14. High and low computer anxiety and positive emotions evoked in distance-learning context

Source: Author's research

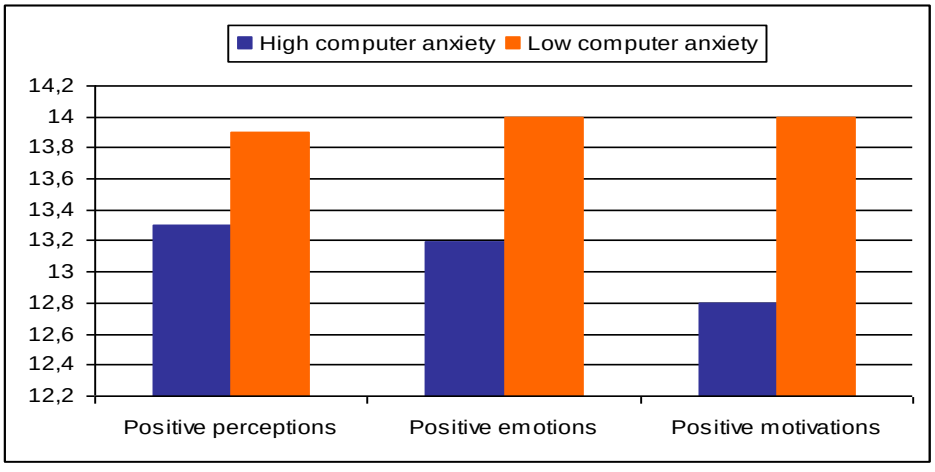

Figure 15. High and low computer anxiety and positive psychological states evoked in distance-learning context

Source: Author's research

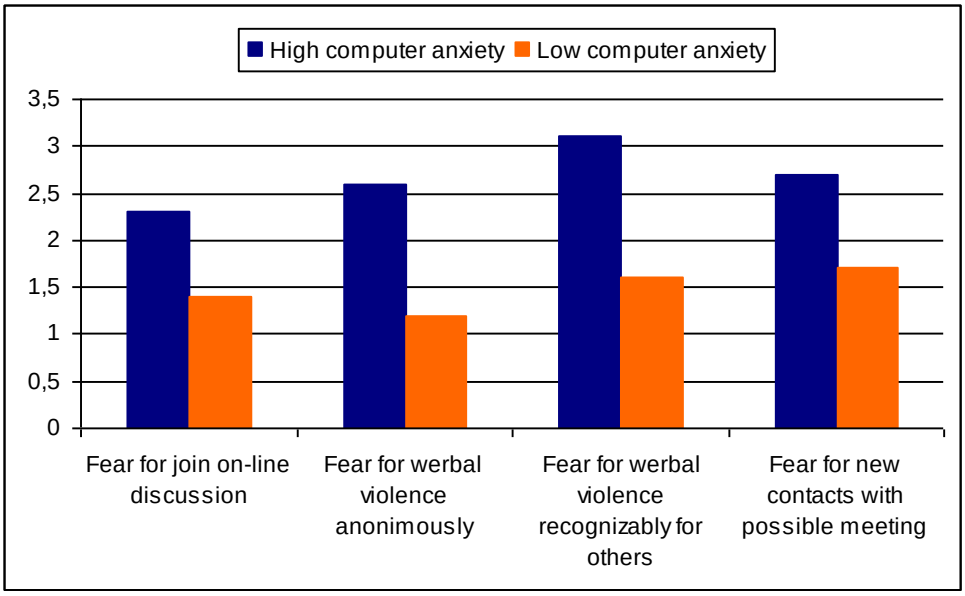

Figure 16. High and low computer anxiety and specific fears of social situations possible on Internet
Source: *Author's research*

The study also recognized strong interrelations between computer anxiety and other kinds of phobic response to computer and Internet use as fear of computer viruses, computer or social violence. Figure 16 illustrates huge differences in the scores of the items of Internet social fears between the high and low computer anxious participants of the study (F(1, 336) =137,166, p = 0).

Some findings were not consistent with Internet social fear scores, concerning the preservice students' perceived social effects and benefits, connected with their Internet and on-line learning usage. The interaction found between the sample and "good impact of Internet" type effects (F (3, 336) = 4, 45; p=0, 004) represented the fact that computer anxious study participants had expressed more positive evaluations of the different aspects of social real and Internet life than low computer anxiety students (Figure 17)

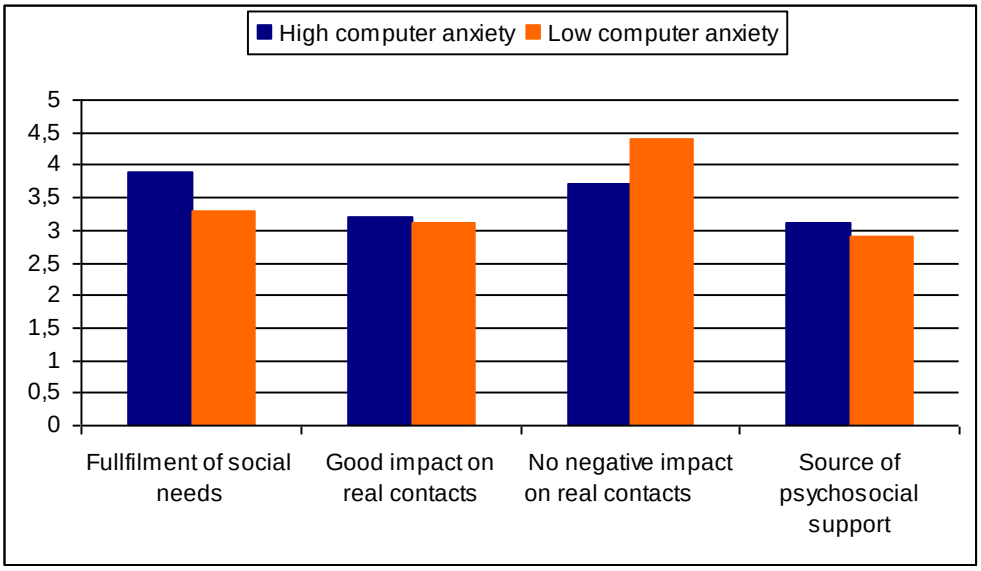

Figure 17. High and low computer anxiety and social benefits perceived in distance-learning context
Source: *Author's research*

CONCLUSION

The study described in this article explored the role of two factors influencing preservice teachers' psychosocial sphere of participation in distance learning as well as their perceptions and acceptance of that form of university education. Those factors were: prior experience of distance learning and computer anxiety. The research results demonstrated the role of both of them in the quality of possible distance learners' psychological and social well-being as well as their attitudes toward distance education formation.

It was found that prior experiences with distance-learning reduced negative emotions and states connected with computer and Internet use, increased the extent and intensity of positive emotions and states evoked by anticipated participation in distance learning, caused more positive perceptions of distance learning and increased a more favourable attitude towards it. According to the influence of computer anxiety on the psychosocial aspects of distance learning, the findings revealed the following way the CAS measured result scores affected the distance-learning perceptions: stronger fear of computer was related to more intensive negative emotions evoked by computer and internet use in the didactic context. Computer anxiety was also found to be related to a reduction in positive emotions and psychological

states and followed less positive and more negative psychosocial effects evoked by computer and internet use in the didactic context.

Since prior e-learning experience as well as computer anxiety hold such importance for the psychosocial adaptation to computer and Internet use and the distance training teachers' key competencies, there is a growing need of taking these problems into consideration by instructors and those who organize distance learning in university settings, especially when such learning is designed for future teachers (Smyrnova-Trybulska 2007; Feiner and Lanz 2010).

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GEARING E-LEARNING FOR THE DEVELOPMENT OF COMMUNICATION IN FOREIGN LANGUAGES AS A KEY COMPETENCE

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Abstract*: Along with emphasising the results of the process of learning: knowledge, skills and competences in many educational systems, a particular emphasis is put on the role of teaching methods in the development of competences, especially the methods and techniques of distance learning, which offer a wide range of possibilities in foreign language teaching and learning, especially in the scope of developing the key competence of communication in foreign languages. The author conducted a survey among law students who learn English with the support of an e-learning platform. The respondents were to assess their language skills and comment on the usefulness of e-learning in the process of mastering particular skills. The results show that e-learning is effective when geared for language learning. There are many advantages of combining the content (professional English) and the form (tasks based on action learning) as exemplified by the author's teaching experience with the Moodle platform.*

Keywords: key competences, communication in foreign languages, Moodle, language skills, e-learning platform.

INTRODUCTION

Recent years saw graduates from Polish universities encounter repeating problems of insufficient competences at the very start of their careers. Equipped with knowledge they are viewed by the employers as individuals who can actually do very little in many areas of activity (Szerląg 2009). Abilities such as creativity, group work, coping with problems or analytical thinking are the values that every employee expects its employee to have.

More and more graduates are aware of the fact that the contemporary world with its ever changing technological progress results in the necessity of adjusting to changing conditions and forms of work. This constant necessity to improve qualifications is the sign of our times. As a result what needs to be done is also to adjust educational systems to the requirements set by labour markets. This conclusion stems from various reports and studies (Osiński 2010). In educational systems of EU as well as other European countries one can observe the focus being shifted to learning outcomes, i.e. knowledge, skills and competences - KSC (Marszałek 2010).

1. THE IDEA OF COMPETENCES

What are in fact *competences* acquired in the process of education? This term comes up in many contexts, but there does not seem to be one commonly accepted definition. The concept of competences is broadly understood. It is used by specialists in many fields such as psychology, pedagogy, management, linguistics or sociology. What strikes us is the variety of references to different theories of education. Competences are also linked to the concept of standardisation and standards of educational achievements (Furmanek 2007). Maria Dudzikowa noted that the term competences functions as a paradigm in the contemporary trends of pedagogy (Dudzikowa 1993). In one attempt at defining the term, the foundation of competences is assumed by Małgorzata Kossowska and Iwona Sołtysińska to be knowledge which may be considered on three levels: knowledge in an ordinary meaning (declarative knowledge – I know what); skills (procedural or active knowledge – I know how and I can); attitudes (I want and I am ready to use my knowledge) (Kossowska, Sołtysińska 2006). How does the European Commission approach competences? According to the European Commission the term competences should be understood as a dynamic combination of *knowledge*, *skills* and *attitudes.* Developing the European Reference Framework the Council of Europe specified a set of the most important key competences which are essential to develop other competences. Thus, the key competences for lifelong learning are competences that all individuals need because they are "necessary for personal fulfilment, active citizenship, social inclusion and employability in a knowledge society" (European Reference Framework, 2007). The eight key competences include communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science and technology, digital competence, learning to learn, social and civic

competences, sense of initiative and entrepreneurship, cultural awareness and expression.

2. COMMUNICATION IN FOREIGN LANGUAGES

Among the most important competences, communication in foreign languages takes a significant position. This competence is based on the same dimensions of abilities as communication in the mother tongue. The first dimension of this competence is defined in the document of the Council of Europe as: ”the ability to understand, express and interpret ideas, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) in an appropriate range of societal contexts — work, home, leisure, education and training — according to one’s wants or needs” (European Reference Framework, 2007). The remaining elements of the second key competence are mediation and understanding cultural differences. It is emphasised that there may be *a different degree of mastery of the competence* of communication in foreign languages within *four language competences: listening, speaking, reading and writing*. In addition, in linguistics they are termed as language skills which function as integrated skills in practice. Mastery of this competence is also subject to a specific foreign language, it is conditioned by the social and cultural context we live in, our environment. Of importance can also be our needs and interests.

3. DEVELOPING COMPETENCES

How should we develop competences? Nowadays we can observe a tendency to replace or at least complement expository methods with activating methods. Dry, automatic repetition of the material, this encyclopaedic style of learning is giving way to competence-oriented education (Osiński 2010). The learner should be able to put the acquired knowledge to practice by means of necessary skills. Is it enough simply to memorize the content? Obviously, better effects can be achieved by developing analytical and synthetic thinking, logical reasoning, creativity, ability to solve problems and to make decisions, group work, efficient communication in the mother tongue and a foreign language.

At the same time, we should emphasise the decisive role of teaching methods in the development of competences. The highly efficient methodological solutions which are already relatively well known and still being explored include methods and techniques of distant learning, particularly the

application of e-learning platforms in education. The possibilities offered by e-learning platforms in foreign language teaching are vast, and most importantly, they respond to the needs of competence-oriented education. In spite of the fact that foreign languages as a subject is regarded as not very susceptible to distant learning, especially in the asynchronous format (Bednarczyk, Rudak 2008), many aspects of teaching language skills may be pursued successfully by means of e-learning. However, the analysis of research carried out in Poland allows us to expect that lacking in impetus though they may seem, "the new forms of education", Beata Stachowiak notes, "cannot be departed" (Stachowiak 2010).

4. E-LEARNING ASSESSED BY STUDENTS

The usefulness of the application of an e-learning platform in education was the subject of the survey conducted by the author among part-time law students learning English during English classes in the form of blended learning as part of the university course at the University of Silesia in Katowice in the academic year 2010/2011. The respondents answered a few questions in the form of Moodle Questionnaire on the faculty's e-learning platform. The questions concerned the students' self-assessment of the particular language skills they acquired at A2 and B1 level. The questions corresponded with the "can-do" statements from the Assessment Grid of the Council of Europe based on the CEF scale specifying in detail language skills according to proficiency levels. The questions also included the students' assessment of the usefulness of e-learning (as exemplified by online classes on the e-learning platform) in the development of particular language skills (figure 1). Total of 91 students took part in the survey: 52 students at A2 level and 39 students at B1. The respondents were to assess particular skills within the 1-5 scale, e.g.:

COMPREHENSION: Reading. "I can understand expressions and most frequently used words related to matters which are important to me, e.g. basic information on myself and my family, shopping, my place of residence and region, employment."

To what extent?: 1. poorly, 2. quite well, 3. well, 4. very well 5. excellently.

The second part of the question was:

"Assess the usefulness of the methods and techniques of e-learning in this respect: very useful, rather useful, hard to say, not very useful, not useful at all."

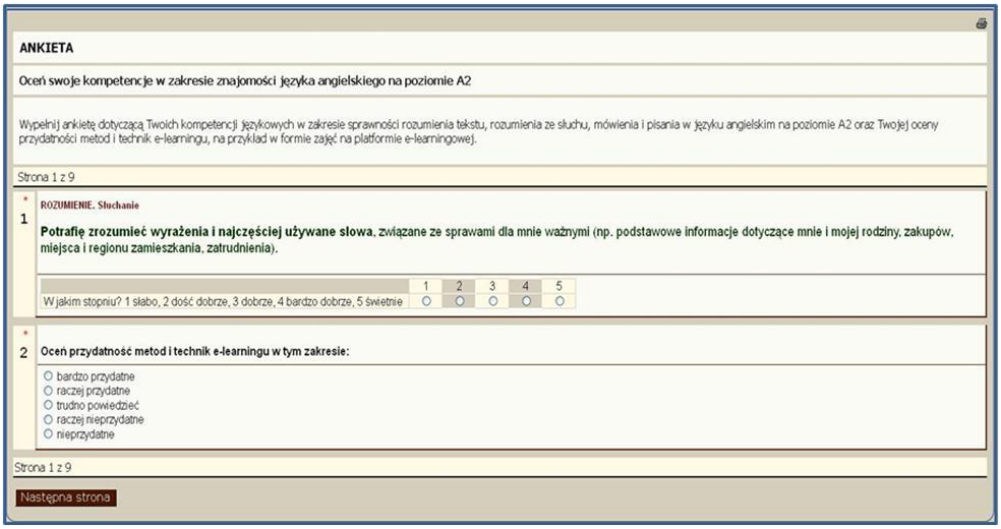

Figure 1. A sample survey question from the survey in the form of Moodle Questionnaire. *Source: http://el2.us.edu.pl/wpia*

The students who took part in the survey assessed their own competences in terms of the extent to which they managed to master particular language skills. The average self-assessment ranks the students above the average mark: respectively, at A2 level: 3,71 out of 5 and B1: 3,54 out of 5, which means that answering the question of how well they can use a particular ability in the scale of 1-5: 1 poorly, 2 quite well, 3 well, 4 very well, 5 excellently. The majority of the students (59%) at both levels point to the usefulness of e-learning in the development of particular abilities (figure 2).

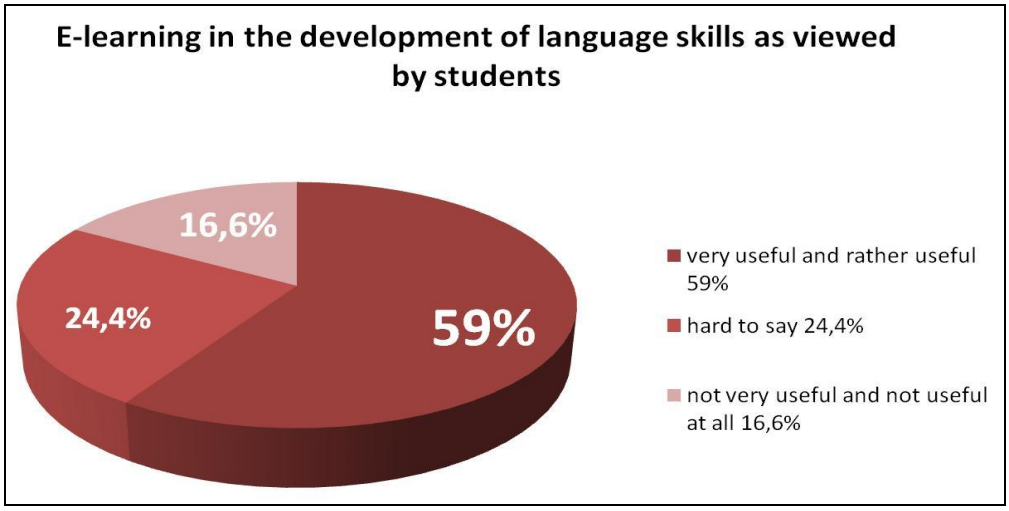

Figure 2. Summary of the survey results.
Source: http://el2.us.edu.pl/wpia

5. ANALYSIS OF SURVEY RESULTS

The students found that e-learning is useful to apply while studying such language skills as writing, reading comprehension and speaking in the aspect of interaction (figure 3). The indication of the first two skills is not surprising. Writing is the skill that can be developed with the support of e-learning more effectively than in traditional teaching, not least because of the individualised approach to the learner. Reading comprehension skill, including also studying structures and building up lexis, largely depends on the learner's own work. The benefits of the e-learning forms of studying in this respect are undisputable, although a lot of self-discipline, motivation and being well-organised is required on the part of the learner. What is surprising is the indication of the skill of speaking in terms of usefulness of e-learning. Perhaps students can appreciate the possibilities of the techniques of distant learning in this respect much better than teachers. Moodle offers for example Nanogong modules: Nanogong Quiz and Nanogong Assignment which consist in the student recording their talk. The tools allow for individualisation of speaking practice, offers convenience of recording one's talk without embarrassment, stress or pressure of other students in class and provides immediate direct feedback from the tutor.

Slightly less than half of the students think that e-learning can help in the development of speaking skill in the aspect of interaction. On average, the students indicated this skill as developed to a relatively lesser extent. Perhaps the students are not aware of the e-learning possibilities of supporting this aspect of speaking, e.g. on the Moodle platform this is offered by a synchronous tool like *Chat* and an asynchronous instrument - *Forum*. Both forms are merely substitutes for a situation in which the skill of speaking is developed. Perhaps a more appropriate form would be a session run by means of a tool like Skype, which is, however, much more troublesome to implement and often seen as too much of a bother. Similarly the effectiveness of the development of the listening comprehension skill is related to e-learning by less than a half of the respondents. In the case of listening comprehension the students assessed it as the relatively best developed skill on average. Paradoxically, the possibilities offered by e-learning in this respect are numerous though.

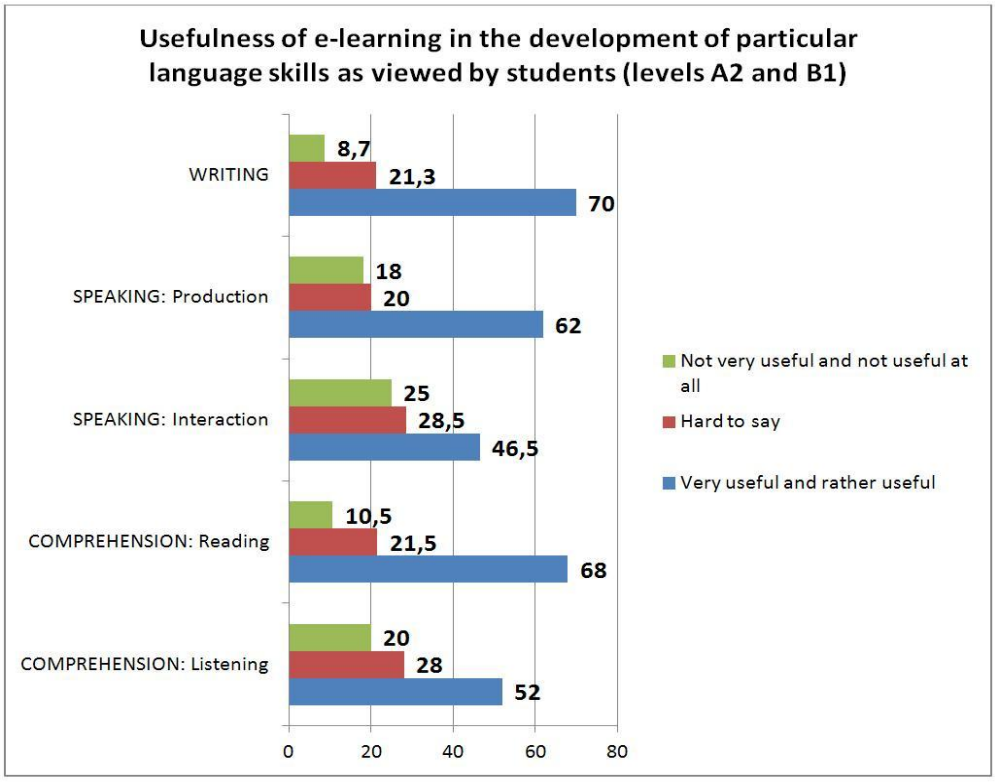

Figure 3. Summary of the students' views on the usefulness of e-learning in the development of specific language skills.

Source: http://el2.us.edu.pl/wpia

6. PRACTICAL EXAMPLES

How can we pursue e-learning actions on the platform in a way that would be compatible with the postulates of competence-oriented education? There are many advantages of combining the content (e.g. professional English) and the form (tasks based on action learning) with the use of the Moodle platform. Some practical examples of such combination from the author's teaching experience may help illustrate it.

Quizzes support the development of reading and listening comprehension skills. Reading comprehension also includes learning structures and building up lexis. Practice in the form of various quizzes are enjoyable not least because students are used to this type of exercises at school. Quizzes allow to get immediate feedback, they offer support in the form of links, graphs,

pictures, audio and video material, and the student can analyse their answers many times or can do the quiz once more.

Nanogong Assignment supports the development of speaking, the student can record their talk on an assigned subject and receives feedback containing correction, remarks and a grade. In the Moodle activity which is useful when developing the skill of speaking shown in figure 4 (Nanogong Assignment), students are to play the role of practising lawyers and to analyse the case of their client. On the basis of the attached materials (audio/video, links) they prepare to give legal advice (they record their talk using online recorder). Feedback goes to particular students individually.

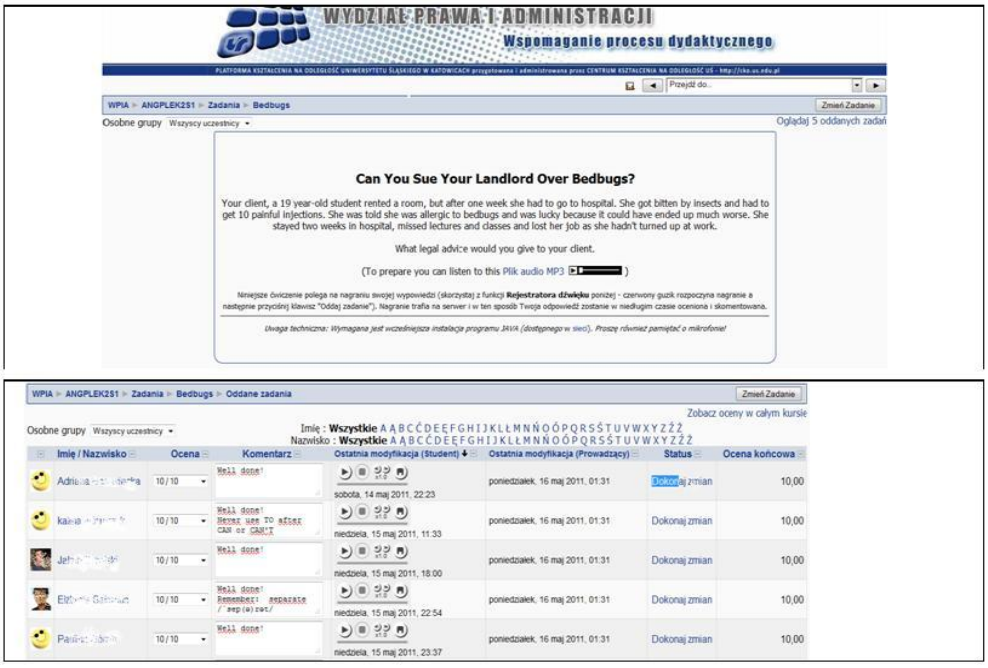

Figure 4. Example of a Nanogong Assignment taken from an English e-course at B2 level.
Source: http://el2.us.edu.pl/wpia

Moodle Assignments, e.g. *Online Text* allow to develop the skill of writing in various practical ways: as an essay, a letter, an advertisement, an e-mail, a project, a webquest, etc. The student can use the editor, post links, audio or video tracks, pictures. They receive correction, remarks and grades.

Some tools, such as *Glossary*, *Wiki*, *Workshop* consist in constructing knowledge, often in the form of editing a glossary, creating a joint project,

commenting on the work of other learners on the basis of set criteria, working in groups. Tasks like these best resemble the professional environment, the students have the opportunity to develop the abilities and attitudes the employers expect them to have.

Chat is an interactive synchronous instrument which can be used to support the abilities necessary to communicate by means of enquiring information, responding, exchanging opinions, reflecting, negotiating, sharing ideas, discussing, etc. This activity indirectly supports the skills of speaking and writing. In the example shown in figure 5 at a specific real time the students are to reach a consensus and produce a joint action plan. The teacher may be an active participant of the chat session but his presence should not interrupt the flow of chatting by concentrating on making immediate comments on language mistakes. When the chat session is over the teacher works out a copied record of the conversation entering comments on language mistakes, highlighting positive examples of the use of appropriate language and sends it to each student individually as feedback.

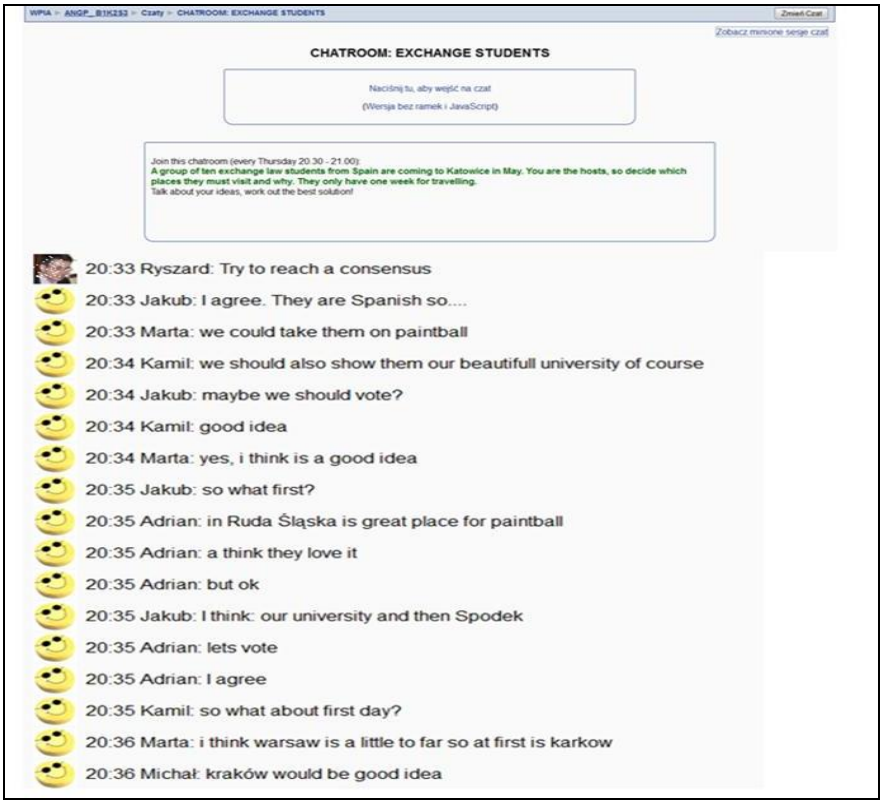

Figure 5. Example of a Moodle Chat taken from an English e-course at B1 level. *Source: http://el2.us.edu.pl/wpia*

A particularly valuable interactive exercise with a range of uses is *Forum*. It can be used for example to support abilities necessary to communicate through exchanging opinions, responding, reflecting, negotiating, sharing ideas, discussing, etc. In the example shown in figure 6, after viewing a short film students talk on a resounding media coverage of the case of violating the law. The forum enables students to exchange opinions, propose legal solutions and measures or remedies, compare and comment on the posts. The students practise the language of persuasion and expressing opinions.

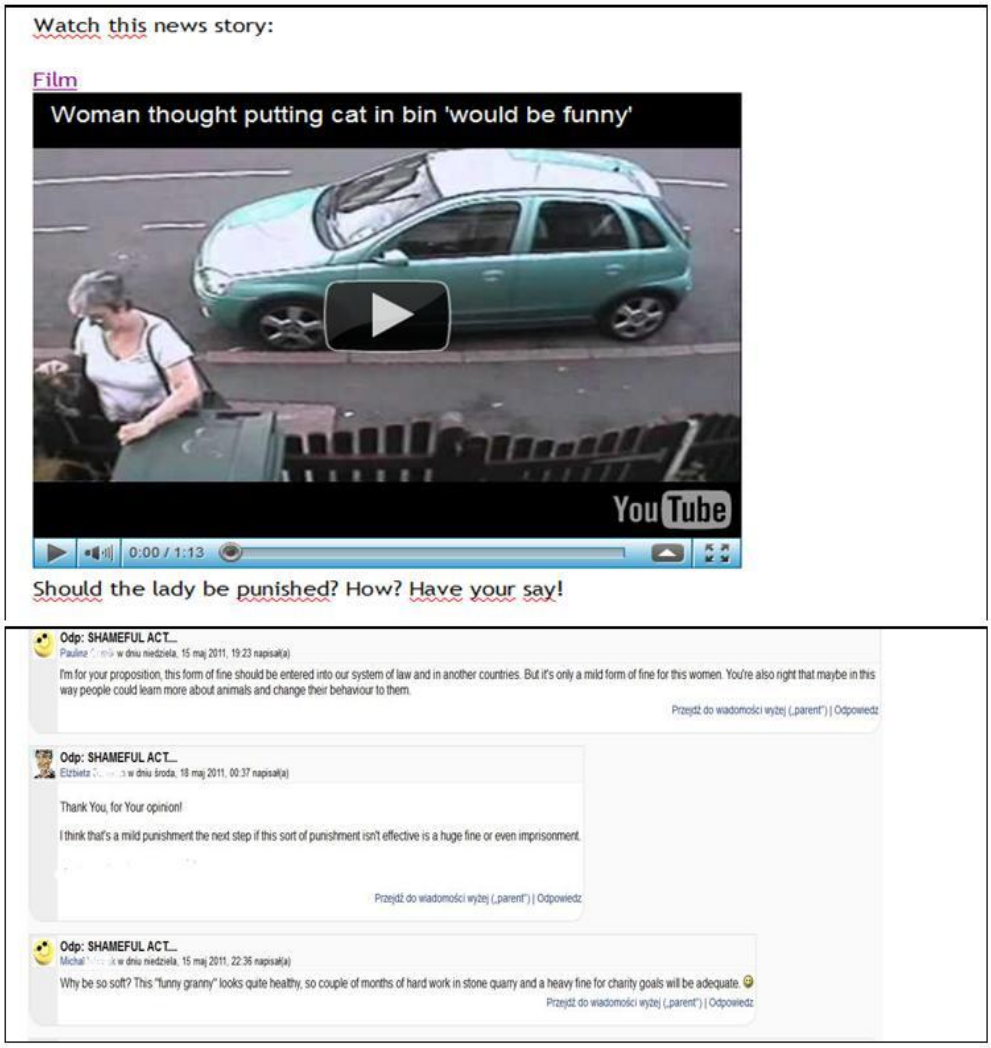

Figure 6. Example of a Forum taken from an English e-course at B2 level

Source: http://el2.us.edu.pl/wpia

CONCLUSION

Taking into consideration the need to develop the key competences in education, also in foreign language teaching in particular, is more and more common. Consequently, this should affect the role of teacher which needs to be redefined. The role of a master delivering knowledge is giving way to the role of an intermediary in the process of seeking knowledge, who is facilitating and enabling the process. The teacher's position is not at all weakening, just the opposite, they are getting support from the latest information and communication technologies. An appropriate use of the methods and techniques of distant learning, where viable, may boost the efficiency of teaching and learning.

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