

TEACHERS' SKILLS AND ICT COMPETENCIES IN BLENDED LEARNING

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***Abstract:** Distance learning in its various forms (e-learning, blended learning, m-learning) is entering the education system at all levels. When planning its implementation, one should be aware of the ICT (Information and Communication Technologies) skills required of teachers as necessary for handling this education mode, particularly for teaching with an educational portal. The paper presents the analysis of teachers' skills and ICT competencies necessary for teaching in a blended learning environment and for organizing the learning process that involves university e-courses. The areas of special importance include: learning materials, organization of learning groups, organization of knowledge evaluation, one-to-one communication, as well as communication with a learning group. The authors review the areas, pointing to certain essential components which are necessary for the teaching process with an LCMS. This topic is particularly important in the case of non-technical and non-IT-oriented universities. This paper is based on the authors' experience in the field of organization and implementation of blended learning at a medical university.*

Keywords: ICT competencies, teachers' skills, ICT, distance education, e-course, blended learning, e-learning

INTRODUCTION

Based on the diversity of knowledge taught to students, one should deliberate on whether distance learning is the optimum method in terms of knowledge acquisition. A competent decision can only be taken by a subject teacher who is familiar with e-learning methodology and capable of making a selection from diverse teaching methods, choosing those which are the best match for mastering the theoretical and practical knowledge of the subject matter. Obviously, a teacher who is not aware of technological options offered by an LCMS or of student engagement methods is not willing to use these in practice. Therefore, the authors place a great emphasis on the continuous improvement of teachers' qualifications in the field of methodologies,

methods and technologies applied in distance learning and blended learning (blended learning = traditional + distance learning).

In Poland, the number of teaching hours at full-time or part-time university studies implementing distance education methods and techniques cannot exceed 60% of the overall volume of teaching hours specified in the syllabus for each particular field of study and education level (Regulation 2011).

TEACHERS' SKILLS AND ICT COMPETENCIES

Distance learning requires its participants (knowledge suppliers and recipients) to meet certain initial criteria, i.e. to have the right competencies specified for a particular educational role (Morze, Kuzminska 2017) and to prepare a hardware and software environment (including an LCMS) for implementation. The authors focus on the analysis of teachers' skills and ICT competencies necessary for teaching according to blended learning methodology, and for organizing the learning process involving e-courses at a university education level.

The primary functionality of a learning portal (LCMS) consists of the building, collecting and distribution of courses, as well as sharing various types of resources. Thus, every e-teacher must be able to handle their course learning materials, because today the majority of such materials contain multimedia and interactive components. Moreover, the teacher should be able to edit these resources in their digital format and to publish them in an e-course. There are certain tools integrated in learning portals that make them fit for versatile implementation in the learning process organization. The areas of special importance include: organization of learning groups, organization of knowledge evaluation, one-to-one communication, as well as communication with a learning group (Roszak, Kołodziejczak, Kowalewski, Ren-Kurc 2016; Noskova, Pavlova, Yakovleva 2017). Teachers' skills and ICT competencies in these fields are therefore indispensable for the efficient performance of blended distance learning and for the proper organization of education for university students. This issue is particularly important at non-technical faculties, e.g., at medical universities or faculties of humanities, where the ICT competencies of the teaching staff are often neglected and marginalized.

In their earlier publications, the authors would frequently point out certain aspects of ICT competencies in distance education, relevant to knowledge recipients and knowledge suppliers. In this paper, the authors re-examine the matter from the perspective of four years' experience with blended learning at a medical university, taking into account the advancement of e-learning technologies, a generational change among university teachers, and younger students coming in, for whom Internet resources are accessible on a daily basis, and the use of such resources is as obvious as the use of electricity (Mokwa-Tarnowska 2016).

The authors review the specific areas mentioned above, pointing to certain essential components concerning the teachers' skills and ICT competencies which are necessary for the teaching process structured around an LCMS (Mokwa-Tarnowska 2015).

Organization and management of learning groups

A learning group plays an important role in distance education, and its good portal management ensures smooth and effective distance learning in practice. Therefore, one should always review the documentation of the LCMS portal being implemented, in terms of the learning group functionality available.

In distance learning, creating a community of learners is very important. Course participants can be members of more than one group (at their own faculty or elsewhere), while a teacher can teach one or more subjects to different groups (including inter-faculty groups). Some learning portals offer the options of grouping learning groups into larger organization units, which are called learning areas (Figure 2). Learning areas are frequently introduced when a teacher teaches the same subject at different faculties, or to students in different years (Kołodziejczak, Roszak, Ren-Kurc, Kowalewski, Bręborowicz, 2014).

An LCMS is usually fitted with mechanisms for allocating class participants to study groups. Such allocation typically takes place on the portal administrator or course teacher level, so that learners can be grouped into various study groups, according to the needs of the specific subject. In addition, the portals offer mechanisms for self-registration for selected courses; this involves prior distribution of a course access key (password) by the teacher (Roszak, Kołodziejczak, Kowalewski, Ren-Kurc 2016).

Figure 1 shows a sample group structure for teaching a course in Pathophysiology for the 2nd year students of the Faculty of Medicine. Group ALL-4_2017 (lecture group) comprises all the 4MD Program students who attend this course in 2017. The students were assigned to that group by the portal administrator according to the list received from the Dean's Office. The students belong to 10 different practice groups (P1-4_2017, P2-4_2017, ... , P10-4_2017) and to 4 seminar groups (S1-4_2017, S2-4_2017, S3-4_2017, S4-4_2017). The remaining groups, namely: final test, retake, and integrative were created by the teacher for the purpose of final knowledge evaluation organization (exam and overall course assessment). Students register themselves for the test date of their choice, upon meeting the pass criteria for the course. Registration was also restricted to appropriate course or seminar groups at a specified time.

| Group management | | List of all learning groups in this course | | |
|---------------------|--|--|---------------------------------------|-----------------|
| Administration | | 25 Entries | Learning area filter | Show all groups |
| All learning groups | | Name » | Description » | Edit » Delete |
| All learning areas | | ALL-4_2017 | 4MD 2016-17 | Edit Delete |
| All members | | extra | 4MD 2016-17 | Edit Delete |
| | | P10-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P1-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P2-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P3-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P4-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P5-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P6-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P7-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P8-4_2017 | 4MD 2016-17 | Edit Delete |
| | | P9-4_2017 | 4MD 2016-17 | Edit Delete |
| | | S1-4_2017 | 4MD 2016-17 | Edit Delete |
| | | S2-4_2017 | 4MD 2016-17 | Edit Delete |
| | | S3-4_2017 | 4MD 2016-17 | Edit Delete |
| | | S4-4_2017 | 4MD 2016-17 | Edit Delete |
| | | S5-4_2017 | 4MD 2016-17 | Edit Delete |
| | | Final test - 13.07 at 10.45am | Final test | Edit Delete |
| | | Final test - 13.07 at 9am | Final test | Edit Delete |
| | | Retake 1 - July 20 at 9am | Final test - retake 1 | Edit Delete |
| | | Retake 1 - July 14 at 9am | Final test - retake 1 | Edit Delete |
| | | Retake 2 - July 27 at 9am | Final test - Retake 2 | Edit Delete |
| | | Integrative 4 | Grupa dla Integrative 4 z 20.07.2017 | Edit Delete |
| | | Integrative3 | Grupa na 13.07 at 9am | Edit Delete |
| | | Integrative | Grupa utworzona dla testu Integrative | Edit Delete |

Figure 1. Group structure for a course in Pathophysiology at the Faculty of Medicine

Source: *Own Research*

Learning group management (Figure 2) by the teacher, i.e. group formation, division into smaller units or combining into learning areas, is a significant aspect of distance learning organization. Visibility and access to different tools and activities, read or write permissions are dedicated to a group and not to individual users. It is also the group that has the right to use the given learning resources at the given time in the portal, including courses, tests, surveys, thematic forums, etc.

| Group management | | Group management | |
|---------------------|--|---------------------------------|----|
| Administration | | Welcome to the group management | |
| All learning groups | | Overview | |
| All learning areas | | Number of groups: | 25 |
| All members | | Number of entire group members: | 77 |
| | | Number of tutors: | 3 |
| | | Number of participants: | 74 |
| | | Number of learning areas: | 3 |

Figure 2. Group management in Pathophysiology course

Source: *Own Research*

Summing up, the administrator's ability to create and manage learning groups is therefore a very important aspect of distance learning, and every e-teacher should have advanced skills and ICT competencies to be capable of doing it.

Electronic knowledge evaluation

Electronic knowledge evaluation, i.e., the examination and self-study (self-testing) process, is an important component of the overall learning process. Portals offer a set of tools for building closed-ended tests and open-ended tasks. Knowledge evaluation and self-learning should be archived automatically, and their basic

statistical analysis should immediately rate the student's achievements. Therefore, the electronic evaluation of students' knowledge should be based on the QTI (Question and Test Interoperability) knowledge testing standard by the international organization IMS (Instructional Management Systems Global Learning Consortium), including the process of archiving these resources. The standard offers an appropriate knowledge evaluation methodology and options for exchanging examination databases between schools and other education units. The originally produced databases are used for several years thereafter - a period of 5 years is assumed as the professional life cycle for learning contents. A teacher who participates in the organization and implementation of knowledge evaluation activities on a learning portal should have the knowledge about this issue (Roszak, Kołodziejczak, Kowalewski, Ren-Kurc 2014).

The teacher's personal experience as a participant in online testing, along with their awareness of the fact that the questions and answer options are randomly assigned to each student, the time and the number of answers to each question is limited and controlled automatically, and the participant can see their result after the end of the test, while their score is immediately published in the collection of all the evaluated tests and tasks. Thus, an e-teacher should be well familiar with the student side of the electronic knowledge evaluation process related to their specific subject, as well as its actual realization in an LCMS.

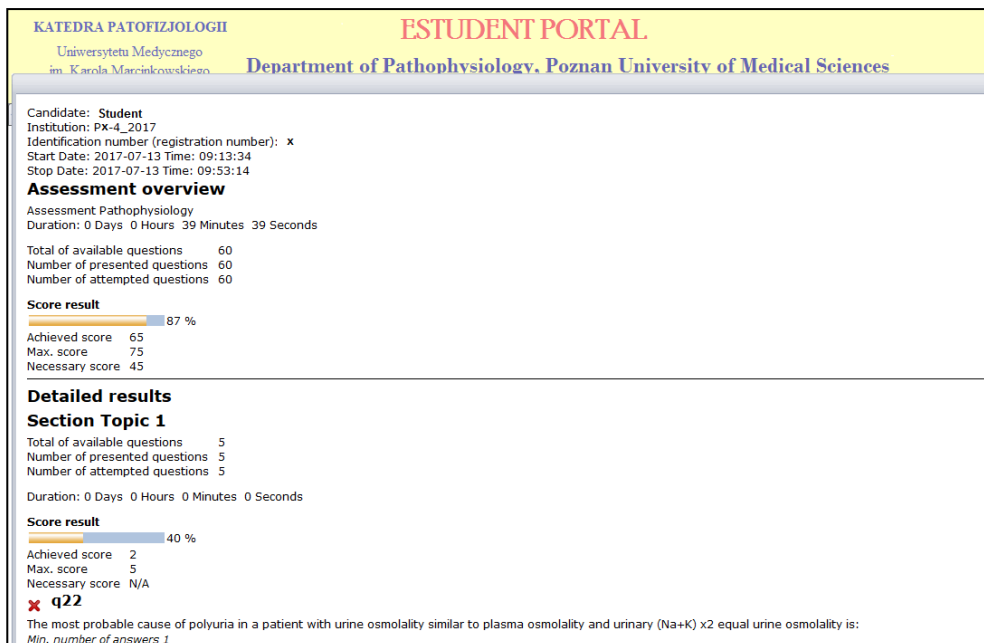


Figure 3. Student test results in Pathophysiology course

Source: *Own Research*

Figure 3 presents a sample test in Pathophysiology, passed by 2nd year students of the Faculty of Medicine, Poznań University of Medical Sciences, which conforms to the requirements specified above. The test consists of theoretical questions as well as practical problems (medical cases) randomly drawn out of 10 topical sections available in the database. The figure below shows the following data: test time (start and stop date), time taken by student to complete the test (39 minutes 39 seconds), number of questions in the test (60), student's results (65 points = 87%), pass threshold (45 points) and maximum score (75 points); the next part of the figure presents the detailed results of the first theoretical section (Section Topic 1) consisting of 5 questions, 40% of which were answered correctly by the student, who received 2 out of 5 available points; below there is also a part of the first question (q22) in this section (questions in each of the 10 sections are drawn randomly for the person taking the test in the specific section).

The teacher must always bear in mind that their students track their learning results on the learning portal, using self-test databases and other refresher resources, and therefore the teacher needs proficiency in analysing these processes and awareness of their execution.

The final stage of knowledge evaluation, which is very important, is the archiving of portal resources. Archiving student knowledge evaluation on the portal involves the automatic gathering of assignment files (tests, tasks, etc.), which are saved in folders according to group allocation. The function of file gathering allows one to manage the above mentioned duties automatically. Work results are usually structured in directories, which can be easily reached through selecting a given group of students. At the same time, the system enables creating various reports, summaries and statistics.

Archiving functions are always available in the database system, yet its proper portal implementation often requires expert knowledge, particularly if scripts need to be written to streamline the process (Roszak, Kołodziejczak, Kowalewski, Ren-Kurc 2016). The teacher should be aware of the significance of this stage (regularly archiving the resources) and should be able to export the test results outside the LCMS.

Summing up, the teachers' skills and ICT competencies relevant to student knowledge evaluation involve primarily creating and updating questions in exam and refresher databases, as well as implementing the knowledge evaluation process on an LCMS, and they are as follows:

- Customizing the progress of a specific test/exam/self-test;
- Choosing the right knowledge testing methodology, including establishing a pass threshold,
- Organizing the testing process on the portal for a group or groups of students at a specified time (more than one option),

- Analysis of a single student's or a group of students' accomplishments, archiving all the knowledge evaluation components.

Communication in distance learning

Communication is an essential part of distance learning, no matter whether an e-learning or blended learning environment is taken into account (Mokwa-Tarnowska 2015; Kołodziejczak, Roszak, Ren-Kurc, Kowalewski, Półjanowicz 2015; Watts 2016). A feeling of isolation and lack of support from the teacher demotivates the learner and often discourages them from carrying out a distance learning project (Pulak 2015). Therefore, the course author and the teacher face an important task of planning and thereafter implementing such course communication methods that will help accomplish the intended learning goals and enhance the learner's satisfaction. This, on the one hand, requires the teacher to be familiar with the communication tools available on the e-learning portal they use, and on the other hand it requires them to anticipate at which course practice stage the learner may need their help. When support is planned properly, unnecessary communication can be avoided, as it may be an excessive burden on the teacher. In addition, the time needed for the learner to wait for suggestions is shortened, and the learner can proceed with the self-learning process.

Learning portals usually offer several communication tools, generally divided into synchronous (e.g. chat, voice communication, videoconferencing) and asynchronous (e.g. forum, e-mail). It can be claimed that the more communication options are available for the teacher within the course, the easier and more efficient it is for the teacher to organize the learning process (Kołodziejczak, Roszak, Ren-Kurc, Kowalewski, Półjanowicz 2015, Noskova, Pavlova, Yakovleva 2017).

Synchronous communication enables course users to communicate in real time. Depending on the portal, this communication can proceed in text, voice, virtual board format, or as video transmission (Lim 2017). The above specified communication channels, particularly videoconferencing, further strengthen the impression of participating in traditional classes and direct contact. However, the simultaneous presence of the teacher and all the course participants can be burdensome for professionally active people, or people in different time zones. In order to engage in voice communication (Voice over IP) and videoconferencing, the teacher must understand the fundamentals of audio/video streaming, and must therefore have more advanced ICT competencies. This is particularly important if any problems occur in setting up the communication - the teacher should be able to diagnose the problem and help the learners overcome certain minor issues, such as a video camera or microphone off, adjusting sound settings in the system.

The advantage of **asynchronous communication** tools is their accessibility anywhere at any time. It provides students with more time to prepare and reflect on topics for discussion. The modern learning management systems offer various

asynchronous communication tools to obtain evidence of collaboration which might be a part of the grading system (Lim 2017).

A forum can be presented in different formats (e.g. as a simple, single-thread discussion, or a question & answer forum, or a blog layout forum), and can serve various purposes in a course, e.g. consulting a teacher or expert, sharing thoughts and views on a specific subject, communicating organizational issues, or socializing (Kołodziejczak, Roszak, Ren-Kurc, Kowalewski, Półjanowicz 2015). The teacher should become familiar with all the options offered by that tool in the actual learning portal, so that they can make an informed decision on the planning of the place and functions of the forum in the actual course. If the students can subscribe to the forum, its functionality range expands further. Typically, posting or moderating a discussion is quite intuitive, not requiring any special ICT competencies of the teacher.

E-mail is currently the most popular way of communicating between participants of the learning process. The best option is when such a service is offered on the learning portal the students use. It will then largely facilitate the organization of message exchange. There is no need to create distribution groups in e-mail software or to use networking site services, as all the necessary information is available in the learning portal databases. The course author should offer e-mail contact options with the portal administrator, the teacher and the learning group, e.g., the study year, seminar group or project group. Using the e-mail client in the portal is usually quite simple, yet certain problems may occur with searching for a specific student or student group and with adding them as message recipients. Therefore, course teachers should be trained in using the portal to improve their competencies in this respect.

Another less frequently used method of communication with an e-learning group in a course is **Calendar**. The knowledge of the options offered by that tool will strongly facilitate the organization of the learning process. Therefore, it would be reasonable to find out the options offered by the portal chosen to manage the learning process. Portals usually offer individual and group calendars for scheduling important events on a course. Instead of distributing such information as exam dates, deadlines for the submission of semester papers, the teacher can publish these items in the calendar in due advance. In this way, the learners can manage their time more efficiently to avoid the accumulation of problems. If the calendar also has the notification function to indicate the approaching deadlines, it becomes even more functional. When a calendar is not available on the portal, one should see whether a **notification** function exists, preferably with a subscription option. Learning new skills in handling group communication tools would significantly facilitate and streamline the teacher's work on a distance learning course.

Learning materials in distance learning

Learning materials are more and more frequently available in multimedia format (Kołodziejczak, Roszak, Kowalewski, Ren-Kurc 2014). These can be audio, video or animation files. Embedding them in the course is the task of the portal

administrator or course author. However, it is the user's role to learn to play a specific multimedia resource. The user's knowledge is not always sufficient to handle this task. Therefore, it is important to publish precise hardware and software requirements in a prominent place in the course (necessary device drivers, codecs, players), operating instructions, and the contact information for help. If support is provided by the university or school, the support organization is responsible for resolving any problems with using multimedia materials. Without outside support, the teacher must have the necessary ICT competencies to offer help to their learners. To do this, the teacher must be generally familiar with the current technologies and their limitations.

RECOMMENDATIONS FOR BLENDED LEARNING

In this part of the article, the Authors present their recommendations for the key issues in the process of improving teachers' skills and ICT competencies necessary for effectively pursuing the teaching process on the basis of a course published on an LCMS portal.

Using specific application

The teacher plans the knowledge conveying and student evaluation process optimizing the time needed, including the preparation of distance learning classes. Every aspect of distance learning must be taken into account, and the use of the selected LCMS to run a blended or e-learning course must be carefully planned to achieve a successful integration, (Kuźmicz, Skrzydlewski, 2012). The organization of the educational process also includes scheduling student communication and, naturally, a strict timeline for testing, ways of submitting open tasks and projects. For example, if the students are required to write an essay, we have to define how their files will be transmitted to LCMS resources. We should also prepare the information about how to successfully transfer a file, as well as specify the deadline for assignments and feedback. Technically speaking, the whole process depends on the LCMS configuration and as such needs to be learned.

Disadvantages of synchronous and asynchronous communication

Chat is a popular communication channel, particularly among young people. Text messengers are integrated in every networking system and can be conveniently used on mobile devices as well. The popularity of chat in daily unrestrained communication does not automatically translate into its usefulness in distance learning. Even a carefully scheduled chat, with the date and time frame for communication and the discussion topics defined significantly in advance, can fail to accomplish a specific learning task. The reason is the difficulty in focusing the attention of a larger group of users on the problems being discussed. Digressions, e.g., regarding course organization aspects, effectively distract recipients from the professional discussion. Discipline and focus on the subject-matter can only be maintained in small groups of 2-3 members, e.g., project groups or seminar groups.

Then, a chat becomes a discussion of a problem and as such can be successful in the learning process. On the other hand, dividing big online classes into smaller groups may lead to an intensive time commitment for online teachers. Furthermore, technical failures and poor internet connectivity may affect the quality of communication. Additionally some e-learning portals do not have tools for synchronous communication, e.g., OLAT (Online Learning And Training).

The basic limitation of asynchronous communication tools is a long waiting time for feedback. It is difficult to get immediate response to e-mails or forum posts, especially on a course for large groups.. This leads to the students being reluctant to participate in the discussion. They are also more likely to copy and paste some content from the internet which, in turn, may result in plagiarism.

Continuous training

The improvement of teachers' skills and ICT competencies in producing learning materials, and teaching online courses is an obvious necessity (Kołodziejczak, Roszak, Kowalewski, Ren-Kurc, Bręborowicz 2015; Malach, Kostolányová, Chmura, 2015; Noskova, Pavlova, Yakovleva, Smyrnova-Trybulska, Morze 2016). The competency improvement process is slow, and therefore training programmes and courses should be both continuous and regular. As soon as a recipient of distance education acquires the requisite ICT competencies, they can switch to the role of a distance teacher (Przybylska 2007), which was often emphasized by the authors in their prior publications and which the authors still consider to be important. Regular teacher training courses and sessions should be a mandatory part of an e-teacher's job, as distance teaching is not for inexperienced and poorly qualified educators.

Practice in distance learning

A vast majority of academic teachers have not yet had an opportunity to participate in distance learning as students. Thus, for highly qualified experts in their specific fields, it would be valuable to participate on a mandatory basis in an e-learning course on any topic. By doing it, they could gain practical experience and appropriate skills necessary to successfully engage in e-learning (communication, activation in conveying knowledge, multimedia, broadly defined knowledge evaluation).

Poland does not have unambiguous official guidance concerning **continuous training** and **practice in distance learning**. Most Polish universities have published internal regulations regarding the requirements and competencies of a teacher applying for the opportunity to teach a distance education course.

CONCLUSION

In order to teach in an e-learning or blended learning environment, a teacher needs to have certain additional competencies, based on the nature of the learning portal. In addition to the professional and organizational competencies, which are

indispensable for a teacher in a traditional classroom, there are certain ICT competencies and competencies related to the legal aspects of working on an e-learning portal. They are as follows:

1. Compilation and publication of professional materials, including multimedia resources;
2. Preparing knowledge evaluation, particularly in the form of tests; analysis of results, notifications to students;
3. Various options of effective student - teacher communication;
4. Archiving learning resources, knowledge evaluation results, contents published on the forum.

The competencies enumerated under point 1 can be supported by IT departments at universities or other education units. However, the activities listed in points 2 to 4 take place in real time (including the archiving process) and as such must be handled by the teacher themselves.

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