



## **ANALYSIS OF STUDENTS' REFLECTIONS ON THEIR EDUCATIONAL BEHAVIOUR STRATEGIES WITHIN AN ELECTRONIC COURSE: DEVELOPMENT OF COMPETENCES FOR THE 21<sup>st</sup> CENTURY**

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***Abstract:** The paper describes how students' reflection on their educational behaviour strategies changes within an e-course. The authors suggest that an e-course design and the organisation of students' independent work can influence the development of the 21<sup>st</sup> century competences. Two profiles of students' educational behaviour during the study process within an e-course can be distinguished: a profile of educational activity and a profile of professionalisation. The focus on professionalisation influences the increase of interest in the learning content, and induces mechanisms of self-regulation and self-management. A student perceives an individual activity as the most comfortable, and associates an e-portfolio with a modern way of professional self-presentation. The focus on educational activities determines the importance of feedback from the teacher, attention to the scores and ratings of educational achievements, as well as the preferences of a group work, where a learner can join in the exchange of experience and demonstrate a creative approach. When designing an e-course, it is advisable to foresee these profiles. The reinforcement of formative assessment techniques support students' self-organisation and initiative as target markers for prospective competences.*

**Keywords:** educational behaviour, reflection, 21<sup>st</sup> century competences, e-learning, digital environment, formative assessment.

## INTRODUCTION

E-learning and blended learning as modern forms of the educational process occupy an important place in the practices of higher education. In this direction, it is possible to outline global and local factors. One of the global factors is digital economy development. Digital technologies are considered a resource for the development of society, they transform all aspects of human life, leading to significant sociocultural changes. Digital tools transform the nature of human activity: its content, organization, and necessary skills, ensure the new quality of results. This also applies to educational activities. It is necessary to remember about new priority competences that will be required by today's students in their future career and implement in training advanced activity models (in particular information activity models). IFTF (Institute for the Future) presented a future work skills summary map in 2011 (IFTF, 2011). Key skills needed in the future workforce were named there: new media literacy, virtual collaboration, transdisciplinarity, design mindset, and other. In this respect, M. Vinagre described a practical experience of developing teachers' telecollaborative competences (Vinagre, 2017).

In the local Russian context, the Atlas of Emerging Jobs was developed with the participation of the Agency for Social Initiatives and Skolkovo (Atlas of Emerging Jobs, 2015). The Atlas presents professions that should become highly demanded over the next 5-10 years. In the field of education, the presented professions not merely require ICT competences, but they are entirely realised

in the digital environment, for example, digital ethics and safety teacher, designer of consciousness training tools, game educator, educational online platform coordinator, etc. To be in such jobs, a person should possess new professional skills and abilities – inter-sector communication, multilingual and multicultural abilities, and interpersonal skills.

The study “Russia 2025: resetting the talent balance” developed a target competences model for future specialist focusing on cognitive (adaptability, solving non-standard tasks) social behavioural (intercultural interaction, communication) and digital skills.

In accordance with actual educational and professional demands, bachelor and master programmes are logically targeted to the development of the 21<sup>st</sup> century professional competences. In a situation of uncertainty and a rapid change in the conditions of professional activity, the ability to take an unconventional decision, innovative approach, has become especially important (Pérez-Peñalver et al, 2018). Today we witness “the growth of the creative economy, mass collaboration, participatory culture, and peer production”, and this idea is a starting point for constructing learning environments (de Aldecoa, 2015, p. 90). Consequently, in this context, it is interesting to analyse a contribution of specific academic disciplines

to this process, to answer a number of practical questions: How does students' reflection on their educational behaviour change in the context of e-learning and blended learning? Can an e-course design and the organisation of students' independent work influence students' understanding of their educational behaviour strategies and form the basis for the development of prospective competences for the digital society?

## 1. METHODS AND PROCEDURES OF THE STUDY

The study was carried out in the Herzen University (Saint-Petersburg, Russia) during the teaching of the course "Information technology" for first-year bachelor students of "Pedagogical Education" programme. In the process of teaching, distance education technologies were used to facilitate students' autonomous work, because according to the higher education standards in Russia, bachelor students should have up to 40% of autonomous work, supported by assignment guidelines. To support training, an e-course was worked out in LMS Moodle.

As one of the most important features of the course, we can note the enhanced function of formative assessment. The main idea is drawing students' attention to the evaluation of their own educational behaviour in the digital environment. By educational behaviour, we understand a system of actions that a learner undertakes to implement the processes of interaction with the educational content and other participants of the learning process (teachers and peers). This phenomenon is closely connected with creating new knowledge, transmitting and distributing it. Consequently, together with educational behaviour goes informational behaviour. Ohtoshi and Gottschalg-Duque proposed a model of informational behaviour that incorporates its main processes and factors (Ohtoshi and Gottschalg-Duque 2016). Lavrik et al described information behaviour as "human activities aimed at obtaining the necessary information and using it for research, production, training, etc., as well as for creation of new information and its dissemination in society" (Lavrik et al 2018, p. 42).

In order to identify the characteristics of changes in students' perception of their educational behaviour strategies while undertaking an e-course, during the process of receiving this new learning experience, an entrance and a final (reflexive) questionnaire were proposed. In the context of the activity approach to understanding the essence of educational behaviour, three generalised components of educational informational behaviour were identified, as well as their main indicators:

- Motivational component (starting level of knowledge for the educational content, interest, awareness of practical importance of solving educational and professional tasks);

- Activity component (comfort of individual and group work, initiative and creative approach);
- Organisational component (reflection and self-management of educational activities, self-organisation, time-management, orientation to the maximum score, orientation to the position in the rating, orientation to the meaningful reflection (need for feedback), awareness of the importance of the electronic portfolio).

For the analysis, 12 main variables were identified as indicators of students' educational behaviour in the particular learning context, analysed in the paper:

1. ICT skills level.
2. Interest in the educational content.
3. Awareness of practical importance of ICT for solving professional problems.
4. Awareness of practical importance of ICT for solving educational problems.
5. Comfort of individual work.
6. Comfort of group work.
7. Initiative, creativity.
8. Self-organisation, time-management.
9. Orientation to the maximum score.
10. Orientation to the position in the rating.
11. Focus on reflection (need for feedback).
12. Awareness of the electronic portfolio value.

The questions in the questionnaires were formulated in such a way that they affected all three of the listed components of educational behaviour, as well as their main indicators. Table 1 shows the examples of questions.

**Table 1.**

**Examples of questions for the entrance and final questionnaires**

Variables	Entrance questions (Relate to the 5-point scale)	Final questions (Yes/No)
<i>Motivational component</i>		
1. ICT skills level.	Your ICT skills level.	Have you improved your ICT skills level?
2. Interest to the ICT (educational content).	Your interest to the ICT.	Has your interest to the ICT increased?

3.	Awareness of practical importance of educational content for solving professional problems.	The importance of the ICT for your future profession.	Do you plan to use the knowledge gained in the classroom in your upcoming professional activities?
4.	Awareness of practical importance of educational content for solving educational problems.	The importance of the ICT for your learning.	Do you plan to use the knowledge gained in the classroom in your upcoming learning?
<i>Activity component</i>			
5.	Comfort of individual work.	I usually complete assignments individually.	I was comfortable completing assignments individually.
6.	Comfort of group work,	When doing assignments, I would like to see how other students perform them.	I was comfortable completing assignments in-group.
7.	Initiative and creativity.	When doing assignments, I try to be creative.	I tried to perform additional tasks that required creativity.
<i>Organisational component</i>			
8.	Self-organisation, time-management.	I try to complete my tasks in time.	I usually completed my tasks in time.
9.	Orientation to the maximum score.	I will regularly monitor my score in the e-gradebook.	I regularly monitored my score in the e-journal.
10.	Orientation to the position in the rating.	It is important for me to see and compare my peers' grades.	I regularly followed my peers' grades accumulation.
11.	Focus on reflection (need for feedback).	The teacher's comments on my assignments are important to me.	Comments and notes in the e-gradebook helped to overcome problems with assignments.
12.	Awareness of the electronic portfolio value.	I consider an e-portfolio a convenient tool.	I liked to keep an e-portfolio of completed assignments.

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*Source: Own work*

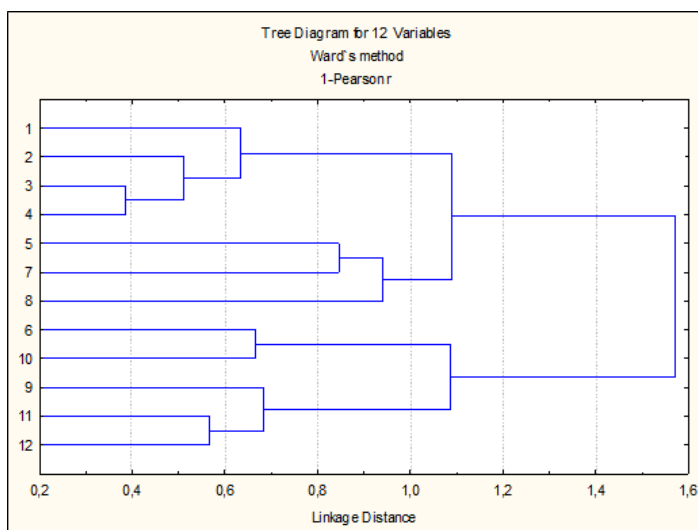
It is important to note that the entrance questionnaire was more of a projective nature from a psychological point of view, because the students only started

to study the new course and could rather assume their future behavioural features in the process of learning. In the final questionnaire, they responded, having already concrete results, showing self-esteem and reflection of the experience gained. In total, 200 respondents took part in the survey. Answers of the respondents were analysed in several directions: a statistical analysis of the entrance and final questionnaires was made (cluster analysis and correlation analysis), and the percentage indicators of positive answers were compared for the selected variables of the two response arrays.

## 2. ANALYSIS OF STUDENTS' REFLECTION ON THEIR EDUCATIONAL BEHAVIOUR STRATEGIES WITHIN AN ELECTRONIC COURSE

### 2.1. Results of the entrance questionnaire

Figure 1 shows the results of the cluster analysis of the responses received during the entrance questioning.



**Figure 1. Cluster analysis of the entrance questionnaire results**

*Source: Own work*

We can distinguish three clusters in Figure 1. The first cluster is formed by variables V1 (ICT skills level), V2 (Interest in the ICT), V3 (Awareness of practical importance of educational content for solving professional problems), V4 (Awareness of practical importance of educational content for solving educational problems). Consequently, this cluster fully includes all selected indicators of the motivational component of informational behaviour. Correlation analysis showed that the closest correlations were found between V3 and V4 —

awareness of the practical significance of the material being studied in solving educational and professional problems ( $r = 0.61$ ).

Consequently, according to students' answers we can conclude that there is a need to strengthen professionally oriented and practically oriented types of activities for learners. It is necessary to mention that this idea finds support in the new generation of educational standards in Russia.

In addition, it is possible to make a conclusion about the need to form competences that ensure the conscious approach to self-education. For this purpose, a system of formative assessment techniques and tools was incorporated to the course. Firstly, a system of questionnaires was developed for students. Together with the entrance and final questioning, each of the topics was accompanied by short reflexive poll (often with the use of mobile technologies) that prompted students to evaluate their progress and to think about possible reasons for difficulties and incomprehension. Secondly, interactive tasks of the same reflexive nature were offered for some of the topics, for example, interactive Venn diagrams where it was necessary to mark the ratio of assimilated and undigested material. Thirdly, each task was provided with criterial rubrics for self-evaluation that helped students to understand to what extent it is necessary to complete the task to get the maximum and minimum score. Fourthly, the course was provided with an e-gradebook, where teachers could not only mark a student's assignment with a certain number of points, but also add comments to explain the reasons of the assigned marks. Finally, it is important that each student was gathering an e-portfolio of all works during the course. All e-portfolios were open to the teacher, and each student could decide whether to open it to peers or not. We can note that most of the students preferred an open e-portfolio, and in the final questionnaire, they admitted that it was very beneficial for their own progress to follow the advancement of other students, to compare completed assignments.

The second cluster comprises variables V5 (Comfort of individual work), V7 (Initiative and creativity), V8 (Self-organisation, time-management). The formation of such cluster leads to the conclusion that it is necessary to take special account of the needs and volitional characteristics of students who seek to work independently, who are sufficiently self-organised and focused on the enrichment of opportunities for solving educational tasks with a reflexive feedback.

However, the range of answers on these variables is quite large and the correlations between these variables are relatively weak ( $r = 0.15$ ). This shows that students do not attach much importance to the nature of their actions. Teachers need to focus attention on this. It is necessary for the development of reflexive competences (Bondarenko, 2019) that helps students to "to become critical formers of their working life and teaching" (Kaiser 2018, p. 191).

The third cluster includes variables V6 (Comfort of group work), V9 (Orientation to the maximum score), V10 (Orientation to a position in the rating), V11 (Focus on reflection, need for feedback), V12 (Awareness of the electronic portfolio value).

The merger of variables V9, V11 and V12 suggests that students seeking to achieve high marks associate the evaluated results with the understanding of what has been achieved, with the ability to systematise and demonstrate the learning results by means of an e-portfolio. A correlation was found between variables V6 and V10 ( $r = 0.33$ ), which confirms the need for evaluating individual achievements in group work. Probably, some students view grouping as an integration of efforts in pursuit of a measured result.

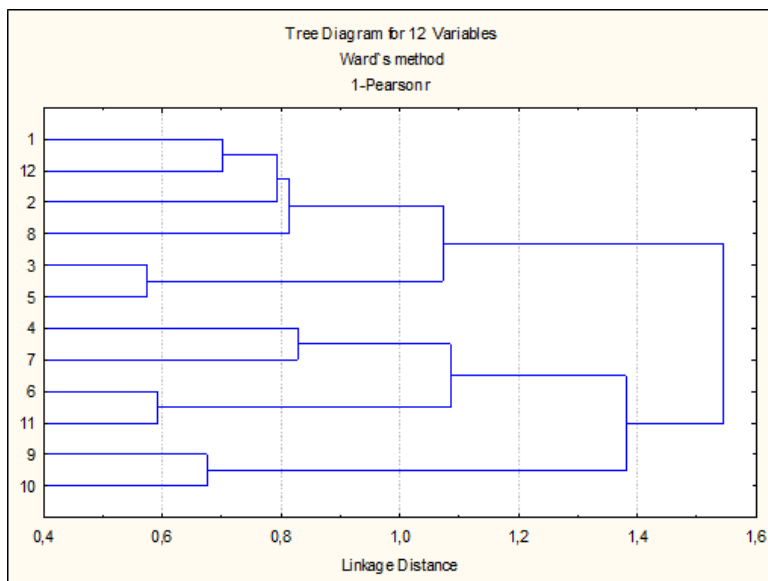
Thus, according to the results of the entrance questionnaire, a “model” collective, rather diverse student’s profile was obtained, based on students’ anticipation of educational behaviour, past experience in learning activities, as well as a slightly idealised “image” of themselves in the context of solving educational problems. A student, who has a high-level motivational component of educational behaviour, is sufficiently knowledgeable of the material being studied and is interested in further improvement. He is aware of the practical significance of the content being studied both in educational and in future professional activities. He is ready to work individually, be creative and systematically organise own activities. In group work, he focuses on the maximum score and position in the overall rating, as well as appreciates feedback from the teacher and is interested in accumulating his work in the format of an electronic portfolio. Consequently, the achievement of the described features of educational behaviour is possible if such “model” benchmarks are incorporated into an e-course during its design.

## **2.2. Results of the final questionnaire**

Figure 2 presents the results of a cluster analysis of the responses received as a result of the final survey.

Here, the situation is significantly different from the entrance questionnaire and reflects the real situation of students’ reflection on their educational behaviour. We can distinguish two clusters. The first cluster is formed by variables V1 (ICT skills level), V12 (Awareness of the importance of the electronic portfolio), V2 (Interest to the ICT), V8 (Self-organisation, time-management), V3 (Awareness of practical importance of educational content for solving professional problems), V5 (Comfort of individual work). This agglomeration suggests that for many students during the learning process supported by an electronic course, interest in the field of information technology was the catalyst for the development of competences that ensure the level of ICT skills. It is important that interest be combined with self-organisation, to support which a number of formative assessment techniques were used in the electronic course.





**Figure 2. Cluster analysis of the final questionnaire results**

*Source: Own work*

Variable V3 (Awareness of practical importance of educational content for solving professional problems) can be considered the most significant; it precisely correlates with the variables V1 ( $r = 0.42$ ), V2 ( $r = 0.36$ ), V5 ( $r = 0.42$ ), and V12 ( $r = 0.34$ ). This is an important outcome of the course, because along with the development of important general cultural competences that ensure human actions in the modern information environment, the task of forming the future professional position of the teacher was considered very meaningful.

The second cluster includes variables V4 (Awareness of practical importance of ICT for solving educational problems), V7 (Initiative, creativity), V6 (Comfort of group work), V11 (Focus on reflection), V9 (Orientation to the maximum score), and V10 (Orientation to the position in the rating). This cluster shows that students in practice experienced a variety of possibilities of receiving feedback while mastering the course. It is important to note that students associate the provided opportunities for group work in the network mode (V6) with the empowerment of meaningful reflection (V11) ( $r = 0.4$ ). Thus, for many learners, their peers' feedback was effective. The actions and the results of others made it possible to understand better their own actions and achievements.

Variable V9 (orientation to the maximum score) has a rather significant correlation with variable V10 (orientation to the position in the rating) ( $r = 0.32$ ). Thus, students confirmed that the current scoring, an open e-gradebook, for many students contributed both to a steady advancement and to striving for timely correction of results.

Interestingly, variable V6 has a correlation with variable V12 ( $r = 0.38$ ), although they belong to different clusters. This link demonstrates an awareness of the e-portfolio effectiveness for presenting the process and the results of group work. This is an important result, since for many students it was the first experience in solving educational problems in the mode of distributed networking. They tested in practice an important technique of continuous reflexive assessment, which they can apply to further training and upcoming professional activities.

According to the two described clusters, two profiles of students' educational behaviour during the study process within this e-course can be distinguished: a profile of educational activity and a profile of professionalisation.

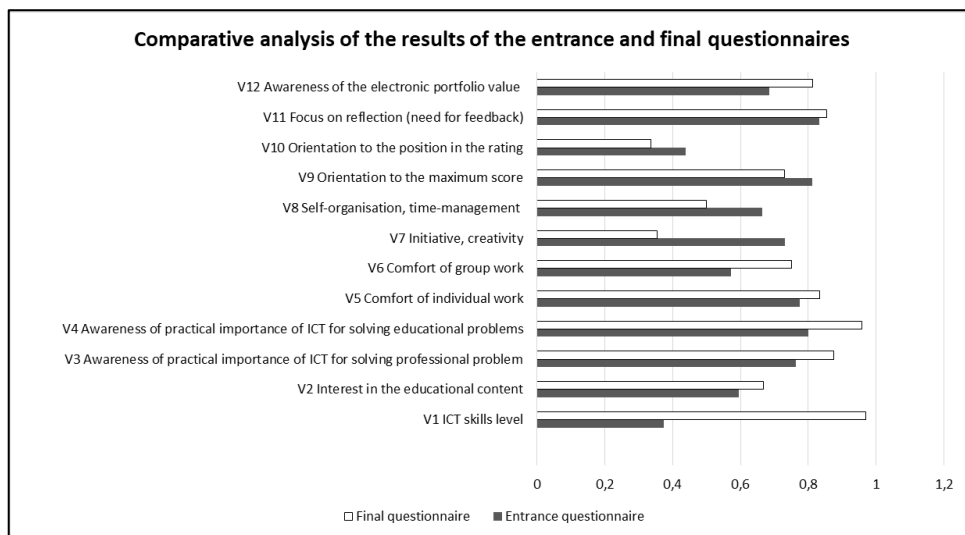
The focus on professionalisation influences the increase of interest in the material under study, and induces mechanisms of self-regulation and self-management. In such a situation, a student perceives an individual activity as the most comfortable, and associates an e-portfolio with a modern way of self-presentation (including professional self-presentation) in the digital environment. This strategy can be named as a "model of personalised individual activity" (Laptev 2013). Here, in the situation of solving the tasks of the upcoming professional activity, a whole range of important competences are developed, including ICT competences and self-organising competences. However, the most important thing is that the development of professionally significant personal qualities are stimulated.

The focus on solving problems primarily of educational activities determines the importance of feedback from the teacher, attention to the scores and ratings of educational achievements, as well as the preferences of group work, where a learner can join in the exchange of experience, discussions, and can demonstrate initiative and a creative approach. Such an activity strategy can be called a "model of distributed educational activity" (Laptev 2013). In such a situation, students, by joining forces and distributing tasks among themselves, achieve high results in a short period.

From all described above, we can conclude that when designing an e-course, along with the described "model" benchmarks, it is advisable to provide different levels of mastering the material. A "profile of educational activity" should be designed as basic and mandatory and a "profile of professionalization" - as an extended and an in-depth route for those who are interested in a more detailed acquisition of the study material for solving future professional tasks.

### **2.3. Comparison of the results of the entrance and final questionnaires**

Further, we present a comparison of the entrance and final questionnaires for students in terms of a number of selected positive answers (Figure 3).



**Figure 3. Comparative analysis of the results of the entrance and final questionnaires**

*Source: Own work*

Figure 3 shows that differences in the responses of students at the initial and final stages of training were found. Most of the variables of the motivational component increased their values. The greatest change is characteristic of the variable V1 (ICT skills level), which is natural, since students took part in a targeted training. At the same time, we see changes of the values for the variable V7 (Initiative, creativity) of the activity component and the variables V8 (Self-organisation, time-management), V9 (Orientation to the maximum score), V10 (Orientation to the position in the rating), and V11 (Focus on reflection) of the organisational component. This can be explained by several reasons. At the beginning of their studies, students could overestimate their abilities (for example, from the point of view of self-organisation). But the feedback they received when studying the course helped them to reflect on this. In addition, in the course of training, priorities could change (for example, the focus on the maximum score was replaced by the satisfaction of the average score due to the complexity of tasks or low interest in specific tasks).

The positive changes reflected in the diagram indicate a certain interrelated transformation of informational and educational behavior of students, which occurred due to motivational, diagnostic, organizational, and controlling methods implemented in the e-course. The e-portfolio allowed students to be creative in mastering the discipline and to try out in practice models of learning interaction in the digital environment. It is important that students could choose comfortable individual or group forms of information activities.

## CONCLUSION

The study described in the paper, proves that students' perception of their educational behaviour changes in the situation of e-learning and blended learning. The vector of these changes largely depends on an e-course design. A significant role in this context play purposefully organised conditions for students' reflection, as well as formative assessment technology. Among the effective tools for formative assessment can be suggested reflexive polls, an e-gradebook, a rating of learning scores, peer assessment, a feedback from the teacher and peers, and an e-portfolio.

At the beginning of a course, students have an idealised model of their behaviour. Consequently, it is advisable to incorporate such "model" benchmarks into an e-course during its design. However, prospective competences for the digital society demand variability and personalisation of learning experiences. In this prospective, a profile of educational activity and a profile of professionalisation can be offered. In the course of study, the possibility of implementing different educational profiles of a student, depending on abilities, preferences, and experience may be provided. This approach is accordant to the adaptive learning ideas.

The data analysis described in the paper, shows that the greatest risks of e-learning and blended learning from students' educational behaviour point of view are related to the organisational component (self-management): learners find it difficult to manage time. This might be the reason for choosing easier assignments that do not require creativity, the lack of aspiration to receive a high score and be in the top-list of learners. This problem is quite frequent and is confirmed by numerous similar studies in this field. Thus, Nkhoma et al, with the use of learning analytics within e-courses, detected poor time-management as one of the main reasons of academic failure (Nkhoma, 2019). One of the ways of solving this problem is the reinforcement of formative assessment techniques that support students' self-organisation and initiative as target markers for prospective competences development.

The future steps of the study involve students' online activities analysis in LMS Moodle with the use of learning analytics methods. That will give an opportunity to compare the changes in students' thinking and reflection with the objective behavioural changes that occur within an e-course.

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