О. В. Яковлева, С. С. Куликова

Образовательное поведение и агентность студентов в персонализированном цифровой обучении

Введение. Цифровые образовательные практики с возможностями персонализации обусловливают внимание к вопросам особенностей образовательного поведения студентов. Особую актуальность в современной ситуации неопределенности приобретает изменение позиции студента в сторону повышения активности, самостоятельности, рефлексии. Целесообразно проанализировать перспективные векторы изменения стратегий образовательного поведения в аспектах взаимодействия, сотрудничества и направленности агентности обучающихся.

Материалы и методы. Методологическую основу исследования составили психодидактический подход к проектированию цифровой образовательной среды, концепции агентности личности и персонализации образования. Исследование проведено на базе РГПУ им. А.И. Герцена среди обучающихся бакалавриата, имеющих опыт изучения электронных курсов с возможностями персонализации (N=50). Разработан авторский опросник, нацеленный на самооценку образовательного поведения студентов в условиях электронного обучения в начале и в конце изучения нового электронного курса по следующим направлениям: личностные цели обучения, стратегии приобретения знаний, стратегии применения знаний, стратегии учебных взаимодействий, стратегии саморегуляции.

Результаты исследования. Анализ результатов показал, что в процессе персонализированного электронного обучения происходит критическое осознание личностных образовательных целей; приобретение новых знаний начинает опираться на расширенную источниковую базу. Вместе с тем, в большей степени принимаются заданные педагогом стратегии применения знаний; намечается приоритет инструментализации взаимодействия над применением новых возможностей сотрудничества. Саморегуляция преимущественно связана с прагматизмом и планированием.

Выводы. Опыт персонализированного цифрового обучения влияет на изменение стратегий образовательного поведения обучающихся: происходит осознание новых возможностей цифрового взаимодействия и сотрудничества, а также проявляются несколько видов образовательной активности - индивидуальная, доверенная и коллективная. Проблемные аспекты связаны с недостаточным опытом сотрудничества в цифровой среде и сложившимися стереотипами деятельности по образцу и алгоритму.

Ключевые слова: образовательное поведение, агентность, студент, высшее образование, цифровое обучение, цифровая образовательная среда, персонализация
O. V. Yakovleva, S. S. Kulikova

Educational behaviour and student agency in personalised digital learning

Introduction. Digital educational practices with the opportunities for personalisation cause attention to the issues of students’ educational behaviour peculiarities in the new conditions. In the modern situation of uncertainty, the changes in students’ position toward increasing agency, independence, and reflexion are relevant. It is advisable to analyse the promising vectors for changing the strategies of educational behaviour in terms of interaction, cooperation and orientation of students’ agency.

Materials and methods. The methodological basis of the study was a psychodidactic approach to designing a digital educational environment, the concept of agency and personalisation of education. We conducted the study in the Herzen University among the undergraduate students with the experience of studying e-courses with personalisation capabilities (N=50). The authors’ questionnaire was developed, aimed at students’ educational behaviour self-assessment in the conditions of e-learning at the beginning and at the end of studying a new e-course in the following areas: personal learning goals, knowledge acquisition strategies, knowledge application strategies, learning interaction strategies, and self-regulation strategies.

Research results. The analysis of the results showed that in the process of personalised e-learning, there is a critical awareness of personal educational goals; the acquisition of new knowledge relies on an expanded source base. Strategies for applying knowledge set by the teacher are more acceptable. The priority of instrumentalisation of interaction over the use of new opportunities for cooperation is detected. Self-regulation is predominantly associated with pragmatism and planning.

Conclusion. The experience of personalised digital learning affects the change in the strategies of students’ educational behaviour. There is an awareness of new opportunities for digital interaction and cooperation, and several types of agency – individual, proxy and collective. Problematic aspects are associated with an insufficient experience of cooperation in the digital environment and the prevailing stereotypes of behaviour according to a model and algorithm.

Keywords: educational behaviour, agency, student, higher education, digital learning, digital learning environment, personalisation

For Reference:
Introduction

The digital learning environment can become an ecosystem for student-centred flexible learning if a learner is motivated, focused on success, and ready to act both autonomously and jointly. The environment allows to create conditions for a personal educational path in higher education perspective. Creating such a path, a learner not only masters the mandatory part of the educational program but also sets his own educational goals, develops digital skills and professional competencies that are in demand on the labour market. Thus, Norsuhaidah et al. showed that student-centred learning facilitates creativity, critical thinking, and communication skills [1]. The demand for the new learning environment and the use of its capabilities depend not only on the external conditions that are created by the educational institution and teachers, but also on the learners’ position. According to Zou et al., learners’ position in the learner network within digital learning, particularly a MOOC, is closely connected with social learning contexts [2]. Therefore, in this prospect, several phenomena deserve attention – a structure of educational behaviour, student agency, personalisation and basic e-learning environment concepts. In this paper, we focus on educational behaviour in terms of personalisation, agency, and e-learning. With the help of the digital learning environment, a new level of educational interactions appears, in which the range of learning objectives is expanding. Along with the responsible performance of assignments, the learner seeks new learning objectives, selects and personally significant assignments, satisfies personal needs and requests. The internal position of a learner in educational and cognitive activity should become not only “performing” but also “comprehending”, and “reflective”.

The purpose of the paper is to analyse the peculiarities and features of educational students’ behaviour in digital learning with a focus on student agency as one of the important factors in building personalised learning.

In this study, we formulated several research questions: How do students show various aspects of educational behaviour in personalised digital learning? What types of agency appear more clearly among students in terms of personalised digital learning? What are the prospects of agency development in terms of personalised digital learning?

Literature review

Human behaviour is “the potential and expressed capacity for physical, mental, and social activity during the phases of human life” [3]. Behaviour comprises various facets – emotions, learning, motivation, perception, personality, etc. 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). Educational behaviour comprises personal learning objectives, personal strategies of knowledge acquisition, personal strategies of knowledge application, personal strategies of learning interactions, personal self-regulation strategies. This phenomenon is closely connected with creating new knowledge, transmitting and distributing it [4].

Moore [5] identified three components of critical interaction in educational contexts: learner–content interaction (L-C), learner–instructor interaction (L-I) and learner–learner interaction (L-L). Nehiri and Aknin underlined that the contemporary
The learning continuum comprises formal, informal, non-formal learning, and collaboration [6]. Marquès Puig et al. listed self-regulated learning strategies “(a) cognition (strategies to remember or elaborate information); (b) metacognition (planning, setting goals, monitoring, and evaluating); (c) motivation (enhance self-efficacy, intrinsic task interest); and, (d) behaviour (help-seeking, time management, and creating a positive learning environment for learning task)” [7, p. 210].

Considering the peculiarities of educational behaviour, we can conclude that it is associated with personalisation. “Teaching and learning is “personalised,” meaning that it addresses the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students” [8].

When a student makes a choice, acts under his goals and needs, he develops such quality as agency. Du et al. described agency as “as a complex, dynamic system including three interrelated aspects: (1) learners' sense of agency, measured through their subjective perceptions of their agency in given contexts; (2) learners' agentic behaviour, measured through their choices and enactment of agency; and (3) learners' interaction with their environment (i.e., teamwork, classroom), whether purposeful or unconscious, active or passive” [9, p. 111]. Nieminen et al. suggested the idea of shared agency in terms of collaborative learning. “Agency is demonstrated when students take initiatives and make contributions during collaboration”, “students might exert agency by resisting teachers' intentions” [10, p.116].

M. Hewson [11] described three types of agency - individual, proxy, and collective. Transferring this idea to the context of educational activity, we can say that a student can act individually (decide independently), on behalf of a teacher (according to an assignment, algorithm, teacher's recommendations), and on behalf of a community (for example, in-group work or a joint project). Bandura [12] described four functions through which human agency is exercised: intentionality, forethought, self-reactiveness (self-regulation), and self-reflectiveness. Therefore, personalisation is associated with agency development, because conscious choice is associated with reflection, planning, foreseeing the result of activity, and evaluating the result.

Houlden and Veletsianos related the issues of agency and flexible education [13] and Bremner wrote about student-centred education [14]. The main ideas of flexibility are associated with the choice of time and place of training, teaching, assessment, and certification.

According to the psychodidactic approach of Noskova, digital learning environment is a special pedagogical essence that is based on three fundamental concepts - educational resources (digital content), educational interactions, and management [15]. Considering the priority of student-centred approach in digital learning, we can conclude that learners’ educational behaviour and agency are important. Thus, Calderón et al. [16] and Mohamad et al. [17] found relations between student-centred digital technologies approach, intrinsic motivation, learning climate, and academic achievements. According to Velaora et al., student-centred learning experience fosters self-management in learning [18]. Clauss et al. suggested Virtual Collaborative Learning concept to support student-centred online group work [19].

In terms of digital learning, new educational behaviour strategies appear. For example, learners gain a strategy for educational content curation and creation. Aguilar-Peña et al. proved that content curation has a significant impact on transversal skills - collaborative work, digital information management, and lifelong learning [20]. Nichols and Stornaiuolo underline the relation of content curation with digital literacy [21].
Learners also expand digital social interaction through participation in the activities of educational or professional-oriented network communities. Kent and Rechavi described three types of interactions among learners in online communities: ‘digitally speaking’ users who actively contribute to the content; ‘digitally listening’ learners who mostly consume the content; and organisers who are involved in the organisation of digital content [22].

Distributed joint activity in the global network implies the development of leadership, tolerance, ethics, initiative, responsibility, readiness for risk, network cooperation and collaboration. According to Gil-Quintana and Vida de León, networking provides opportunities for transmedia educational products, content sharing, and exchange [23]. Vasodavan et al. added that experience in virtual communication and moderation allows developing social skills of sharing information, egocentric and allocentric elaboration, application and transfer, coordination, and reflection [24].

Digital self-management through educational activities stimulates the competencies of self-organisation, self-management, reflection, digital time management, cognitive skills.

Open digital self-presentation makes it possible to demonstrate a personal image by various means, by creating social personal resources, media channels. This is an important skill for the digital economy. This area of professional tasks includes ethical issues and a critical attitude to broadcasting human and professional values with digital language and tools. Hernández-Serrano et al. advice that young people should be provided with “self-representation practices for safe and sustainable identity narratives on social networks” [25].

Research digital practice implies the study of a wide digital space, finding like-minded people, experts, social and professional partners in an open information environment; determines the tendency to increase the level of educational tasks being solved, the desire to search for creative solutions, promote original products, facilitate students’ self-realisation in education.

Materials and Methods

The research took place in the Herzen State Pedagogical University of Russia, the Institute of Information Technology and Technological Education, the Chair of Digital Education, which has been making research on personalised learning for several years. Fifty (50) bachelor students, future teachers of Informatics and ICT took part in the research described in this paper. During the year 2021/22, because of the pandemic, all courses of this study programme were delivered in blended and e-learning formats. Therefore, students had the experience of undertaking an e-course with the opportunities of personalised learning. The ideas of personalised learning included an active learning position, content diversity and variability of tasks, reflection, consciousness, collaboration, and responsibility [26].

In this study, we focused on the following aspects of educational behaviour in personalised digital learning – personal learning objectives, personal strategies of knowledge acquisition, personal strategies of knowledge application, personal strategies of learning interactions, personal self-regulation strategies. The logic of the study assumed an entrance and final survey of students, in which, firstly, they had to anticipate their educational behaviour in personalised digital learning, and, secondly, assess how they really behaved. In the questionnaire, the respondents were asked to relate the statements to the 5-point Likert scale (1 – absolutely irrelevant, 2 – irrelevant, 3 – sometimes relevant, 4 – relevant, 5 – very
The statements in the entrance and final questionnaires were similar but referred the future and past according to the survey stage. All variables (semantic units of each question) studied in this article are presented in the Table 1. For example, a sample question to the “personal strategies of knowledge acquisition” block is the following:

“How did you master the educational content? Relate each statement to the 5-point scale, where 1 – absolutely irrelevant, 2 – irrelevant, 3 – sometimes relevant, 4 – relevant, 5 – very relevant:

- I used handwritten notes
- I used digital notes
- I used digital visualisation
- I made digital comments
- I used searched for information from supplementary sources”

Questions in all other blocks were formulated similarly. The questionnaire was created using the Google Forms service. Descriptive statistics methods, correlation and cluster analysis were used for data analysis (performed with “Statistica 10” software package).

The research started with the following hypothesis: personalised digital learning experience influences the change in educational behaviour strategies, particularly; it facilitates understanding of new opportunities for digital interaction and collaboration and developing various types of agency - individual, proxy, and collective.

## Results

Descriptive statistics on entrance and final surveys are shown in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Entrance survey</th>
<th>Final survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>1</td>
<td>Minimal effort and time</td>
<td>4,2</td>
<td>4,0</td>
</tr>
<tr>
<td>2</td>
<td>Simultaneous improvement of all competencies</td>
<td>4,2</td>
<td>5,0</td>
</tr>
<tr>
<td>3</td>
<td>Increase of volume and quality of autonomous work</td>
<td>3,5</td>
<td>4,0</td>
</tr>
<tr>
<td>4</td>
<td>Going beyond the educational program</td>
<td>3,6</td>
<td>4,0</td>
</tr>
<tr>
<td>5</td>
<td>Handwritten notes</td>
<td>3,6</td>
<td>4,0</td>
</tr>
<tr>
<td>6</td>
<td>Digital notes</td>
<td>3,7</td>
<td>4,0</td>
</tr>
<tr>
<td>7</td>
<td>Digital visualisation</td>
<td>4,1</td>
<td>4,0</td>
</tr>
<tr>
<td>8</td>
<td>Digital comments</td>
<td>3,4</td>
<td>4,0</td>
</tr>
<tr>
<td>9</td>
<td>Information from supplementary sources</td>
<td>3,5</td>
<td>3,0</td>
</tr>
<tr>
<td>10</td>
<td>Individually solve practical cases</td>
<td>3,8</td>
<td>4,0</td>
</tr>
<tr>
<td>11</td>
<td>Collaboration in solving practical cases</td>
<td>4,0</td>
<td>4,0</td>
</tr>
<tr>
<td>12</td>
<td>Complete assigned tasks according to the program</td>
<td>3,8</td>
<td>4,0</td>
</tr>
</tbody>
</table>

**Table 1**

Descriptive statistics on entrance and final surveys (source: own calculation)
Analysing descriptive statistics on entrance and final surveys, we see that the results of the entrance and final surveys do not contradict each other; major trends in student understanding of their behaviour in personalised learning are obvious. This means that students adequately assess their goals, opportunities and behaviour strategies. The significance of all variables is within “sometimes relevant” to “relevant”. Many variables are characterised by a noticeable dispersion of values (this is shown by the standard deviation), which shows the diversity of students’ opinions.

However, there are some differences worth attention. In terms of personal learning objectives, we see the downgrading of the variable 1 (minimal effort and time) and 4 (going beyond the educational program). This may mean that even without going beyond the educational program and basic content, students spent a significant amount of time on their assignments. The increase in the value of the variable 3 (increase of volume and quality of autonomous work) confirms this assumption.
Addressing personal strategies of knowledge acquisition, we see a slight decrease in the significance of variable 5-8 (handwritten notes, digital notes, digital visualisation, and digital comments), but an increase in significance of the variable 9 (information from supplementary sources). Thanks to the proposed tasks, students had to search for additional knowledge sources, which has a positive effect on an active position in learning.

In terms of personal strategies of knowledge application, we see that completing assigned tasks according to the program (variable 12) in fact turned out to be more significant. In addition, this corresponds to the increase in the significance of the variable 15 (digital tools recommended by the teacher).

Analysing median values of variables that characterise personal strategies of learning interactions, we see the increase of variable 22 (visualisation of communication) and the decrease of variable 23 (networking). By visualisation of communication, here we mean the transfer of information using images, as well as symbols, emoticons, memes, etc. It is quite natural for young people and we can conclude that the communication tools (for example, messengers) chosen within the framework of the studied courses allowed visualisation. The complexity of this type of activity to explain the decrease in the significance of networking compared. Networking requires experience, preparation, clear organisation and adequate use of appropriate digital tools and platforms. Therefore, this direction is still a prospect for the further development of electronic courses.

Personal self-regulation strategies variables retained the evaluation trends. Analysing median values of variables, we can see changes in variable 29 (estimate the time spent on a particular task) which shows a conscious approach to time planning on the one hand and a pragmatic approach to task selection on the other. Here, we reaffirm the importance of the increase of volume and quality of autonomous work for students.

Cluster analysis showed changes in the distribution of entrance and final survey variables. In the entrance survey, variables form two clusters. The upper cluster comprises two sub-clusters. The first one is associated with a communication learning strategy that involves saving time and critical reflection on the efforts spent. This means that in the students’ view, interaction and cooperation are associated with a faster achievement of the set goal because of the possibilities of mutual help, information exchange, and collective intelligence. The second cluster is associated with the ideas of reflective learning aimed beyond the standard. It is noteworthy that this cluster includes only one variable from the “personal strategies
of learning interactions” block, so students rarely associate reflection and interaction. The lower cluster is connected with personal strategies of knowledge acquisition and application, including a sub-block of educational and practice-oriented contexts and digital tools. This association also includes digital tools recommended by the teacher.

The cluster pattern of the final survey differs from the entrance survey. The upper cluster shows the relationship between the concept “objective-result”. To achieve the goal, reflection and self-regulation are necessary. Variables of the “personal strategies of learning interactions” block are semantic key in the lower cluster. Here we reveal such semantic elements as new communication possibilities (for example, visualisation), expansion of communication, communication to expand the information field and learning contexts, qualities necessary for successful interaction (agency, critical thinking, sociability). In addition, this cluster will include situations for solving educational problems (individually or jointly) and the qualities necessary for this (ethics and creativity).

Discussion

Schulz et al. [27] found that collaboration needs additional attention within e-courses. For example, students need extra guidance; help with digital tools for collaboration, tasks need to be adopted for collaboration, etc. “Learning objectives are the expected behavioural outcomes of the students at the end of a certain instructional process” [28, p. 5044]. To have meaningful student learning, it is important to integrate learning objectives with assessment. For example, a number of reflexive actions should accompany the choice of an educational and cognitive task. Have I chosen appropriate tools (e.g., digital tools) to solve the task? How did I interact during solving the problem (with environment stakeholders, digital content, etc.)? How I improve the effectiveness of problem solving? Do I make a choice myself or act on the instructions of others? In the digital learning environment, there are opportunities to use various and even redundant content, varies information resources that require choice and critical comprehension. There are possibilities of personalising educational and cognitive activities and building an individual path, connecting initiatives and youth activity with educational activities.

Belyakova and Zakharova [29] studied some traits of students’ interaction with digital content in terms of personalisation. They found students choose content according to their educational profile and identified typological groups among students – “passive”, “active”, “advanced”, “professionally oriented” and “humanities”. Students of all courses showed low activity in working with such educational content, such as audio lectures, electronic simulators (computer-based training programs), electronic training courses, and MOOCs.

In order to facilitate student agency in the digital environment, teachers have to be aware of the new educational demand and the modern behaviour of young people growing up in the digital world. Several studies show that the distinctive features of the “digital natives” activities include the immediate use of information to solve problems, parallelism and multitasking, instead of consistency and gradualness, the use of multimedia capabilities, rather than printed text, the variability of self-presentation in the digital environment, because of the instrumentality of digital platforms [30-34].

Gerasimova et al. [35] described their experience in designing e-courses with personalised approach. As in our study, the researchers undermine that basic traits of personalisation
are the opportunity to select content, to change the sequence and logic of assignments, to choose a level of task, to choose a digital tool.

Thus, in the digital environment of continuous education, a student performs the following reflexive actions:

- formulating own goals, determining the level of their achievement in comparison with own capabilities, preferences, and interests;
- designing an educational route based on the flexible functionality of educational resources;
- implementing learning activities based on the adaptive choice of resources and tools;
- performing self-assessment with digital tools;
- adjusting own learning path after of self-assessment and external assessment;
- deciding on further self-development and learning.

A learner creates his personal learning environment where his intentions for formal, non-formal, and informal education are realised.

**Conclusion**

The research hypothesis was proved in our study. Personalised digital learning experience influences the change in educational behaviour strategies, particularly, it facilitates understanding of new opportunities for digital interaction and collaboration and developing various types of agency – individual, proxy, and collective.

For a more detailed commentary on the hypothesis, it is necessary to answer the research questions presented in the introductory part of the paper.

Firstly, how do students show various aspects of educational behaviour in personalised digital learning? The results of the survey demonstrated that in personalised learning, students are ready to spend extra time on their assignments. They are also ready to search for more information in supplementary sources. This might be associated with the emergence and awareness of personal meanings and interests in learning. At the time of goal setting, there is a tendency to oppose interaction and reflection: interaction is understood to improve performance, and reflection is understood to support independent work. However, the learning experience allows students to see more opportunities for interaction. Interaction as a phenomenon and digital tools it requires are being associated not only with the acceleration of problem solving but also with the digital transformation of interaction, the expansion of its social and professional contexts. Therefore, it is quite natural that learning in the digital environment is more in line with digital content learning tools than with traditional “hand” tools.

Secondly, what types of agency appear more clearly among students in terms of personalised digital learning? Our survey showed students show mostly individual and proxy types of agency. For example, when turning to peers for help, they are mainly focused on tackling their own challenges in reducing the time and effort to get the job done.

Thirdly, what are the prospects of agency development in terms of personalised digital learning? Personalised learning with collaboration, peer learning and peer assessment (as in the e-courses mentioned in the paper), provides a stimulus for collective agency development. For example, perspectives are related to community resilience education ideas that now are presented in environmental education. In addition, some ideas appear in virtual community resilience that are discussed in terms of pandemic.
Changes in professional consciousness, in the process of digitalisation of a specialist’s activities, are also associated with new requirements, which are determined by the challenges of the information society, the knowledge society. The competitiveness of a specialist today depends on the degree of his independence, activity, and initiative. Mobility, adaptability, the ability to self-change the subject under the influence of external factors of the social environment come to the fore. Hence the demand for such personality traits as dynamic self-development, continuous professional development. The value of a new professional, informational culture of the subject, actively and effectively mastering new technologies, means and methods of professional activity, is increasing. Implementation of the strategy of continuous education of the individual.

Therefore, an additional problem is related to preparing students at all levels of education for the full disclosure of their personal potential. We are talking about initiative, purposeful, productive interactions of a learner with a dynamically changing digital (learning) environment. A learner forms a personal learning environment adjusted to personal educational goals and a set of objectives adopted in achieving these goals. For that, a learner attracts open resources, joins digital learning environments of various levels and content, according to personal request and needs.

There are several areas for further research. Firstly, a comparative study of educational behaviour for undergraduate and graduate students could reveal more subtle features of educational behaviour strategies. Secondly, a comparative study of educational behaviour for students of humanitarian and technical specialties could also be beneficial for higher education practices development.

Acknowledgements

The research was supported by the Ministry of Science and Higher Education of the Russian Federation (project No. FSZN-2020-0027).

The research was prepared as part of the project “Professional up-bringing of future teachers in the context of digital transformation of the educational environment of a modern university”, supported in the framework of the competition for the promising fundamental research works by young scientists of the Herzen University.

REFERENCES


**Information about the authors**

**Olga V. Yakovleva**
Cand. Sci. (Education), Associate Professor, Department of Digital Education
Herzen State Pedagogical University of Russia
E-mail: o.yakovleva.home@gmail.com
ORCID ID: 0000-0002-5878-099X
Scopus Author ID: 56501775600
ResearcherID: T-7447-2017

**Svetlana S. Kulikova**
Cand. Sci. (Education), Associate Professor, Department of Digital Education
Herzen State Pedagogical University of Russia
E-mail: kulikovasvs@gmail.com
ORCID ID: 0000-0002-2006-8112
Scopus Author ID: 57212090979