

Digital Educational Environment in University: Who Is More Comfortable Studying in It?

Marina G. Sorokova

Moscow State University of Psychology & Education,
Moscow, Russia,

ORCID: <http://orcid.org/0000-0002-1000-6487>, e-mail:
sorokovamg@mgppu.ru

The article presents the comparative empirical study findings of the opinions of students after completing e-courses in mathematical methods in psycho-educational researches in blended learning format according to the “flipped classroom” model. Possible learning difficulties are examined, the involvement, learning and testing independence, the practical benefits and the attitude to this format among master’s programs and second higher education programs students as compared with undergraduate programs students are assessed. Using the logistic regression analysis method the predictors characterizing each of these categories are determined. Contrary to expectations, the differences are not fundamental, which refutes the prevailing stereotypes. The overwhelming majority of both groups students did not have significant difficulties, the tests were useful for better content assimilation, the e-course allowed them to track their individual trajectory, and there were enough personal contacts with the teacher. Master’s programs students and students of the second higher education ones almost unanimously disagree that the e-courses reduce the education quality, but agree that the use of online-courses is a modern need, and it is high time to introduce them. Almost all students of both groups believe that online-learning solves the problems of employed students, and claim that they like this e-course. Students of master’s programs and students of the second higher education ones are more likely to argue that they studied much more intensively in e-course seminars than in traditional in-class education, and immediately got involved in the learning process, and less often agree to replace face-to-face classes with webinars. They somewhat less often confirm that they helped classmates at the seminars. The course is rated as practically useful. The problem of dishonest strategies requires further investigation. The total sample size $N = 344$ students of psychological faculties of the Moscow State University of Psychology and Education.

Keywords: blended learning, flipped classroom model, e-course, mass open online course (MOOC), digital technologies in education, university digital environment, logistic regression analysis.

Funding: The reported study was funded by the Moscow State University of Psychology and Education (MSUPE) in the framework of the research project “Digital Technologies in Higher Education: Development of Technology for Individualizing Education Using E-Courses”.

For citation: Sorokova M.G. Digital Educational Environment in University: Who is More Comfortable Studying in It? *Psikhologicheskaya nauka i obrazovanie=Psychological Science and Education*, 2020. Vol. 25, no. 2, pp. 44—58. DOI:10.17759/pse.2020250204 (In Russ.).

Цифровая образовательная среда университета: кому более комфортно в ней учиться?

Сорокова М.Г.

ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация
ORCID: <http://orcid.org/0000-0002-1000-6487>,
e-mail: sorokovamg@mgppu.ru

Представлены результаты сравнительного эмпирического исследования мнений студентов, завершивших обучение в электронных курсах по тематическим методам в психолого-педагогических исследованиях в смешанном формате по модели «перевернутый класс». Выявлялись возможные трудности обучения, оценивались вовлеченность, самостоятельность изучения курса и прохождения отчетности, практическая польза курса и отношение к такому формату у студентов программ магистратуры и второго высшего образования в сравнении со студентами программ первого высшего образования. Методом логистического регрессионного анализа определялись мнения-предикторы, характерные для каждой из этих категорий. Установлено, что различия не носят принципиального характера, что опровергает сложившиеся стереотипы. У подавляющего большинства студентов обеих категорий существенных трудностей в изучении курса в смешанном формате выявлено не было, тесты оказались полезны для лучшего усвоения материала, курс позволил им отслеживать свою индивидуальную траекторию, а личных контактов с преподавателем было достаточно. Магистранты и студенты второго высшего образования почти единодушно не согласны, что электронный курс снижает качество образования, но согласны, что использование онлайн-курсов — это потребность времени, и чуть реже согласны, что давно пора их вводить. Почти все студенты обеих групп считают, что онлайн-обучение решает проблемы работающих студентов, и утверждают, что им понравился данный курс, различия состоят лишь в модальностях ответов. Студенты магистратуры и второго высшего, в отличие от студентов первого высшего образования, чаще склонны утверждать, что в электронном курсе на семинарах они работали гораздо интенсивнее, чем при классическом обучении, и сразу включились в работу над курсом, а также реже соглашались заменить очные занятия на вебинары. Они несколько реже подтверждают, что на семинарах помогали однокурсникам, но различия лишь в модальностях ответов и очень малых процентных расхождениях. Курс оценивается как практически полезный. Проблема нечестных стратегий требует дальнейшего исследования. Общий объем выборки N=344 студента психологических факультетов Московского государственного психолого-педагогического университета.

Ключевые слова: смешанное обучение, модель «перевернутый класс», электронный учебный курс, массовый открытый онлайн-курс (МООС), цифровые технологии в образовании, цифровая среда университета, логистический регрессионный анализ.

Финансирование: Работа выполнена при финансовой поддержке ФГБОУ ВО «Московский государственный психолого-педагогический университет» в рамках научно-исследовательского проекта «Цифровые технологии в высшем образовании: разработка технологии индивидуализации обучения средствами электронных учебных курсов».

Для цитаты: Сорокова М.Г. Цифровая образовательная среда университета: кому более комфортно в ней учиться? // Психологическая наука и образование. 2020. Том 25. № 2. С. 44—58. DOI:10.17759/pse.2020250204

Introduction

In the context of globalization and digitalization of higher education, the scope of the application of digital technologies in various formats is expanding — blended learning (BL), mass open online courses (MOOCs), various hybrid models [6; 11]. For example, from 2016 to 2018, the University of Illinois has significantly expanded the number of online programs and courses with a wide coverage of the international population [20]. Analytical review of the digitalization of medical education in Germany [17] emphasizes that current trends in digital teaching and learning are mobile, interactive and personalized formats, as well as the growing relevance of learning platforms. The authors note that new didactic formats that adapt to the changing educational behavior of students are recognized more widely than traditional ones. According to a survey by the European University Association (EUA) among 250 universities from 37 countries, 91% of universities already used a blended learning system in 2017, 82% simultaneously introduced distance technologies and MOOCs [5].

Thanks to modern digital technologies, universities around the world interact in a network form and implement curricula of other universities, increasing the accessibility and quality of education. In Russia, online education is one of the priority areas of state policy in the field of education. [7] Universities that want to be powerful educational clusters must develop interactive courses with elements of distance learning. [15] The modern educational paradigm involves the creation of smart universities in order to

provide each student with the opportunity to build an individual profile of competencies with which he or she will enter the labor market in a digital economy and will be in demand there [1] And even external conditions related to force majeure circumstances of the spread of pandemics of viral infections force universities to fully switch to distance learning formats as soon as possible. In this regard, the problem of the empirical assessment of various aspects of learning in the digital educational space is of particular relevance.

Previous studies results

According to the results of opinion polls, students are mostly positive about online learning. About 60% of students studying in the United States believe that the blended learning format is much more effective than traditional full-time [5]. The advantages of using electronic resources, the students participating in the survey at Tomsk Polytechnic University [2] consider: access to educational records, tutorials and assignments; testing and the ability to perform tasks online; the opportunity to ask the teacher a question at any time, hyperlinks to sources, video lectures. The results of our pilot empirical study of the possibilities of the electronic training course “Mathematical Methods in Psychology” are also consistent with these conclusions [13]. Similar advantages when using LMS Moodle in teaching a number of special and general scientific disciplines are noted in [4]. The same results are confirmed by students participating in electronic courses according to surveys and analysis of the opinions

of their classmates on forums [9]. At the same time, the results of a survey on the youth social network of 18—25 years old show [8] that only about 11% are familiar with MOOCs, and lack of time is the main reason for not using MOOCs.

The “flipped classroom” model is the focus of researchers. This model embedded with an e-scaffolding learning support system using electronic resources and interactive methods for organizing students’ activities increases their engagement and critical thinking level [18]. Students positively assessed the possibility of cooperation and interaction with peers and instructors in teaching psychotherapy according to the model, but not all groups worked optimally, and accountability to other group members did not always ensure pre-classroom preparations [19]. The flipped classrooms enriched by blended learning from various sources positively affect students’ motivation and engagement in learning English [16].

According to observations [14], learning in online courses develops general cultural competencies among students — the ability to self-organize and self-educate, the skills of using information and communication technologies. According to [3], an important touch to the portrait of a student who is successful in online learning is the connection of subjective satisfaction with the awareness of the benefits of the knowledge gained. The authors also note that the older the student, the more critical he is about the content of educational courses in both full-time and online format. A comparative analysis of the attitude of students of different education levels to learning in the digital environment of the university was not conducted yet.

Study design

Comparative empirical study of students’ attitudes toward learning in the two developed by us e-courses (EC), “Mathematical Methods in Psychology” (EC MMinP) and “Statistical and Mathematical Methods in Psycho-Educational Researches” (EC SMMinPER), posted on the LMS Moodle

platform on the website <http://e-learning.mgppu.ru>, was conducted at the Moscow State University of Psychology and Education (MSUPE) in the framework of the research project “Digital Technologies in Higher Education: Development of Technology for Individualizing Education Using E-Courses” <https://dthe.mgppu.ru> in the fall semester 2019/2020. Both courses include 3 compulsory modules for studying basic methods of mathematical statistics, the second of them is an additional 4th module on multidimensional statistics. We compared students’ opinions after completing the first 3 modules.

The “flipped classroom” model was used: students watched video-lectures at home, and actualized new information in an active and interactive format at seminars. They solved case-tasks in SPSS, learned methods of translating psychological content into the language of mathematics and interpreting the results of quantitative data analysis. Cases to solve are based on authentic situations arising in psychological and educational researches. We asked problematic questions, focusing on the key points and typical mistakes of students, and also facilitated their interaction and mutual assistance at the seminar. The internal e-course control tasks including online input test, 3 training tests, final online test and individual case-task of 6 cases were performed by students independently. Students also anonymously filled out the questionnaire “Students’ Opinions on EC” through the LMS Moodle system. Access to the questionnaire was opened only after completing the e-course by the student.

Subject of the study: The attitude to the learning process in the digital university environment of the two students categories, i.e., attending master’s programs and the second higher education programs, on the one hand, and undergraduate programs and program majors, on the other.

Purpose of the study: to compare the views on learning in the digital educational environment of the two categories university

students who completed the e-course, and to identify their similarities and differences.

Goals: 1. to identify the strengths, weaknesses and possible difficulties of the e-courses studying, to assess the attitude to online learning in a mixed format and the practical benefits of the e-courses from the point of view of the two categories students; 2. to assess the independence of e-course control tasks execution and attitude to dishonest strategies in online learning, as well as interaction and involvement in the educational process according to students of both categories; 3. define a set of typical predictor opinions characteristic of both categories of students.

Hypothesis: Students attending master's programs and the second higher education programs will experience more difficulties in the study of e-courses than students attending undergraduate programs and program majors, and their attitude to the format of electronic courses will be more skeptical.

Data analysis methods. The analysis of empirical data was carried out using descriptive statistics methods, the Chi-square test for assessing the differences between the two distributions [12] and the logistic regression analysis method [10]. The analysis was performed in the SPSS statistical package of the 23rd version.

Sample description. The sample consists of $N_1 = 161$ students (17.4% of men and 82.6% of women) attending master's programs and the second higher education programs (EG1) as well as $N_2 = 183$ students (18.6% of young men and 81.4% of girls) attending undergraduate programs and program majors (EG2) covering program tracks in psychology and psychopedagogical education. Total sample size is $N = 344$ students.

Both groups significantly differ in age (Chi-square test, $p < 0.001$). The EG1 group is mainly adults: 17.4% are students aged 20—24, 13.0% are 25—29 years old, 24.8% are 30—34 years old and 44.7% are 35 years old and older, while in EG2 youth

predominates — 16.9% under the age of 20 years, 81.4% — 20—24 years old, and only 1.6% are 25 years old and older. Both groups also significantly differ in the nature of employment (Chi-square, $p < 0.001$). Compared to EG2, in EG1, work is related to the program track they attend in 51.6% vs 5.5% students, not connected — in 31.7% vs 41.5%, and 16.8% vs 53.0% currently do not employ at all.

Results

We divided the questions according to the content into 5 groups. The 1st group, "Possible difficulties and advantages of e-course training", comprised 11 questions, the 2nd group, "Attitude of students to studying at the EC", also included 11 questions. The questions of the 3rd group — total 7 — related to the independence of e-course control tasks execution and the use of dishonest strategies in online learning, the 4th — the independence of the EC content study and involvement in the educational process — total 10. In the last 5th group there were 3 questions about the practical use of both e-courses content for developing of graduation qualification papers. The questions were statements, the degree of agreement with which was assessed by respondents on a 4-step ordinal scale of "no — rather, no — rather, yes — yes".

We assumed that students of both groups have a set of typical opinions about online learning that will allow to separate one group from another. To determine the most significant beliefs — predictors of the respondents' group affiliation — we used the method of logistic regression analysis (LRA) with the Forward LR inclusion of variables in the equation based on the maximum likelihood ratio.

LRA allows to predict the likelihood of an event from the totality of the values of many attributes. In our case, such sets were alternately each of the 5 groups of questionnaire questions — independent variables X_1, X_2, \dots, X_n . The dependent variable Y , which takes only one of two values,

means to belong to one of 2 categories of students — this is the number 0 (the event did not happen, that is, in our case, “the student is attending master’s program or the second higher education program”) or number 1 (the event occurred, that is, “the student is attending undergraduate program or program major”). When determining the predicted value from the totality of the values of the independent variables, the LRA method calculates the probability for each student and, based on this probability, the student is assigned one of two values of the binary variable. If the probability turned out to be less than 0.5, the student will be assigned to the category of students attending master’s program or the second higher education program ($Y = 0$), otherwise — to those attending Bachelor’s program major ($Y = 1$). The quality indicators of the model constructed by the logistic regression method are the combined criteria for the model coefficients — the value of the Chi-square and Nagelkerke R-square statistics. The first of them reflects the influence of the set of predictors on the dependent variable, and the second shows the proportion of the influence of all predictors on the variance of the dependent variable.

In the 1st group of questions “Possible difficulties and advantages of e-course training”, the LRA method distinguishes 4 predictors: “It is difficult to get used to the new form of training in BL-format” ($B = 0.290$, $p = 0.029$, $p < 0.05$); “The tests offered in the EC helped me to better assimilate the course content” ($B = -0.371$, $p = 0.027$, $p < 0.05$), “The EC allows me to always be aware of my grades, tasks, and topics of study” ($B = -0.629$, $p = 0.015$, $p < 0.05$); “In EC, I had not sufficient personal contacts with the teacher” ($B = -0.440$, $p < 0.001$). A positive regression coefficient B indicates that the higher the student’s degree of agreement with this predictor question, the more likely he is in the “undergraduate programs and program majors (EG2)” category. Negative values of B speak in favor of membership of a student

who agrees or rather agrees with this statement, in the category “master’s programs and the second higher education programs (EG1)”. The Chi-square statistic value for the model is 32.522, $p < 0.001$, therefore, the set of selected predictors has a significant effect on the dependent variable. The Nagelkerke R-square is 0.120, i.e., the set of predictors explains 12.0% of the variance of the dependent variable.

The accuracy of predicting membership in the EG1 group is 48.4%, and in EG2 is 74.3%. The overall prediction accuracy is 62.2%. Thus, the opinions highlighted are quite typical for students of undergraduate programs, but they do not allow with sufficient confidence to attribute respondents with an opposite point of view on these issues to students attending master’s programs and the second higher education programs, since the prediction accuracy is less than 50%.

To clarify the interpretation, we checked the differences between the distributions of answers to predictive questions of students in EG1 vs EG2 according to the Chi-square test. The results are presented in the summary table (table 1).

As the table. 1 shows, only less than 20% of students in EG1 and less than 30% in EG2 experience difficulties in adaptation to EC in the BL-format, but the differences are not significant. The overwhelming majority of both categories students confirmed tests to be useful for better assimilation of the EC-content, but among EG1-students the proportion of acknowledgements is significantly larger ($p < 0.01$). Both student groups, almost in their entirety, believe that the EC allows them to track their individual trajectory, with only a small but significant predominance of the share of EG1 ($p < 0.05$). Opinions about the lack of personal contacts with the teacher were distributed more evenly, into 3 almost equal parts, however, while among more experienced students of EG1 about 40% talk about the deficiency of such contacts, then among young people of EG2, on the contrary, about 40% completely

deny this. Note that in both categories the vast majority — about 60% in the EG1 and about 70% in the EG2 — affirm that there were enough contacts with the teacher, the differences are not statistically significant. This is clearly contrary to the common stereotype.

The 2nd group of questions related to attitudes toward learning in EC; 11 parameters were included in the analysis in total. The LRA method identified 5 predictors: “The use of ECs reduces education quality” ($B = 0.535, p = 0.005, p < 0.01$); “The use of ECs is a modern need” ($B = -0.471, p = 0.001$), “Please indicate whether you liked this e-course” ($B = -0.833, p < 0.001$); “Online-learning solves the problems of employed students who can’t attend classes” ($B = 0.740, p = 0.005, p < 0.01$). “It is high time to use e-courses” ($B = 0.842, p < 0.001$). The Chi-square = 51.102, $p < 0.001$, therefore, the set of selected predictors has a

significant effect on the dependent variable. 18.4% of the variance of the dependent variable is explained by predictors. The accuracy of predicting membership in the EG1 group is 62.7%, in EG2 is 72.7%, so the identified predictors can be fairly confidently considered as opinions that are characteristic of students in each category. The overall prediction accuracy is 68.0%. The differences between the distributions of answers to the questions-predictors are presented in table. 2.

According to the table. 2, the vast majority of students deny the stereotypical opinion that the quality of education decreases with the use of EC, and among more experienced students of EG1 there are even more ($p < 0.05$). The EG1 students more unanimously support the view that the use of ECs is a modern need ($p < 0.01$). The e-course aimed at teaching mathematical methods in psychology and education and mastering

Table 1

Distributions of answers to questions-predictors about the possible difficulties and benefits of training in e-course in EG1 as compared with EG2 (N = 344)

Predictor	Student category	Answer				Chi-square	p-value
		No (%)	Rather, no (%)	Rather, yes (%)	Yes (%)		
1	2	3	4	5	6	7	8
It is difficult to get used to the new form of training in BL-format	EG1 (N ₁ = 161)	54,0	28,6	17,4		6,964	0,073
	EG2 (N ₂ = 183)	42,6	29,0	28,4			
The tests offered in the EC helped me to better assimilate the course content	EG1 (N ₁ = 161)	6,2		36,0	57,8	12,917	0,005
	EG2 (N ₂ = 183)	18,1		33,3	48,6		
The EC allows me to always be aware of my grades, tasks, and topics of study	EG1 (N ₁ = 161)	0,6		99,4		10,879	0,012
	EG2 (N ₂ = 183)	6,5		93,4			
In EC, I had not sufficient personal contacts with the teacher	EG1 (N ₁ = 161)	31,1	29,2	39,7		5,099	0,165
	EG2 (N ₂ = 183)	40,4	30,1	29,5			

the SPSS, that is, at a “non-core” subject, nevertheless was supported by ca 90% students of both categories, and the differences are not significant. In addition, somewhat larger percentages of EG2 students agree that online-training solves the problems of employed students and it is high time to use the ECs. Are not agree that the introduction of ECs is timely, only about a fifth of the EG2 students and about a quarter among EG1 ones ($p < 0.01$).

The 3rd group of questions concerning independence of e-course control tasks execution and using of dishonest strategies in online learning included 7 statements, but only one predictor was identified: “There will still be students

who use dishonest strategies by testing” ($B = 0.285$, $p = 0.038$, $p < 0.05$). It has a statistically significant effect on the dependent variable, since the Chi-square for the model is 4.394, $p = 0.036$ ($p < 0.05$). Nagelkerk’s R-square is 0.017, meaning this predictor explains only 1.7% of the variance of the dependent variable. The accuracy of predicting membership in the EG1 is very low, only 26.1%, but it is very high for the EG2 — 88.5%. The overall prediction accuracy is 59.3%. Consequently, affirmative answers to this question are quite typical for students of EG2, but it cannot be considered that negative answers are characteristic of EG1. The differences between the distributions of answers on this question of EG1 students

Table 2

Distributions of answers to questions-predictors about attitudes towards training in e-course in EG1 as compared with EG2 (N = 344)

Predictor	Student category	Answer				Chi-square	p-value
		No (%)	Rather, no (%)	Rather, yes (%)	Yes (%)		
1	2	3	4	5	6	7	8
The use of ECs reduces education quality	EG1 (N ₁ = 161)	47,8	46,0	6,2		9,045	0, 029
	EG2 (N ₂ = 183)	44,8	38,8	16,4			
The use of ECs is a modern need	EG1 (N ₁ = 161)	15,5		43,5	41,0	14,090	0,003
	EG2 (N ₂ = 183)	30,1		43,2	26,8		
Please indicate whether you liked this e-course	EG1 (N ₁ = 161)	6,8		93,1		6,031	0,110
	EG1 (N ₁ = 161)	10,4		89,6			
Online-learning solves the problems of employed students who can't attend classes	EG1 (N ₁ = 161)	3,1		23,0	73,9	11,702	0,008
	EG2 (N ₂ = 183)	2,7		10,9	86,3		
It is high time to use e-courses	EG1 (N ₁ = 161)	26,1		50,3	23,6	12,003	0,007
	EG2 (N ₂ = 183)	19,1		39,9	41,0		

vs EG2 ones are as follows: “no” 3.1% vs 4.4%, “rather, no” 23.0% vs 7.1%, “rather, yes” 40.4% vs 50.3%, “yes” 33.5% vs 38.3% (p = 0, 001).

The questions of the 4th group — total 10 — related to the independence of the EC-content study and involvement in the educational process using the EC. 5 predictor questions were identified: “I studied at the seminars (or webinars) in BL-format more intensively than at full-time traditional training” (B = -0.564, p <0.001); “I didn’t get involved in the training with EC immediately, but from ca the middle of the time assigned for its study” (B = 0.463, p <0.001), “At the seminars I helped (a) classmates” (B = 0.301, p = 0.015, p <0.05); “In EC, I

had not sufficient personal contacts with the teacher” (B = 0.316, p = 0.012, p <0.05). “It would be more convenient if there were only webinars instead of face-to-face classes in the EC” (B = 0.578, p <0.001). The value of Chi-square is 60.473, p <0.001, so the influence of predictors on the dependent variable is significant. They account for 21.8% of the dependent variable variance. The accuracy of the prediction of belonging to EG1 is 66.5%, to EG2 — 74.2%, therefore, here we got a set of opinions that are quite characteristic for each group. The overall prediction accuracy is 70.5%. The differences between the distributions of answers to the predictor questions are presented in the table. 3.

Table 3

Distributions of answers to questions-predictors about the independence and involvement in the educational process using e-course in EG1 as compared with EG2 (N = 344)

Predictor	Student category	Answer				Chi-square	p-value
		No (%)	Rather, no (%)	Rather, yes (%)	Yes (%)		
1	2	3	4	5	6	7	8
I studied at the seminars (or webinars) in BL-format more intensively than at full-time traditional training	EG1 (N ₁ = 161)	5,0	29,8	41,0	24,2	17,745	0,000
	EG2 (N ₂ = 183)	18,6	30,1	28,4	24,0		
I didn’t get involved in the training with EC immediately, but from ca the middle of the time assigned for its study	EG1 (N ₁ = 161)	36,6	21,1	29,2	13,0	22,086	0,000
	EG2 (N ₂ = 183)	18,0	24,0	28,4	29,5		
At the seminars I helped classmates	EG1 (N ₁ = 161)	34,2		65,8		0,598	0,897
	EG2 (N ₂ = 183)	32,9		67,0			
In EC, I had not sufficient personal contacts with the teacher	EG1 (N ₁ = 161)	31,1	29,2	39,7		5,099	0,165
	EG2 (N ₂ = 183)	40,4	30,1	29,5			
It would be more convenient if there were only webinars instead of face-to-face classes in the EC	EG1 (N ₁ = 161)	36,0	46,6	12,4	5,0	26,396	0,000
	EG2 (N ₂ = 183)	19,7	40,4	20,8	19,1		

Note (compare Table 3 and Table 1) that when conducting the LRA in this group of variables, we again included in the analysis the question of the deficiency of personal contacts with the teacher, who was already in the 1st group of questions, since it is quite suitable here in meaning, and he was again among the predictors with a slight predominance (by 10%) of the share of positive answers in EG1. Consider other predictors. A quarter of students of both categories confidently confirms more intensive learning at seminars in EC than at full-time traditional training ones, and a little less confidently confirms it even more than 40% of EG1 students and about 30% of EG2 students. The negative answer “No” is given only by 5% of students of the EG1 and less than 20% of the EG2 ($p < 0.001$). Indeed, BL-seminars involve very intensive activity to actualize learning content studied independently. Belated inclusion in the EC learning process is more typical for students of EG2: about 30% confidently confirm this as compared with students of EG1, and less confidently one third in both groups, while only about 18% of students of EG2 deny this, and among EG1 students share in the learning process in a timely manner is twice as much ($p < 0.001$). Two-thirds of students in both groups helped classmates at seminars; there are no significant differences. More than 80% of EG1 students do not agree to replace face-to-face meetings with webinars, and among EG2 students the share is about 60% ($p < 0.001$).

Finally, out of the 3 questions of the **5th group, evaluating the practical benefits of both e-courses**, only one question became a predictor: “The information of this EC will help me use mathematical methods to analyze empirical data in my graduation qualification paper” ($B = -0.376$, $p = 0.019$, $p < 0.05$). This predictor significantly affects the dependent variable: the Chi-square is 5.875, $p = 0.015$, $p < 0.05$, however, it explains only 2.3% of the variance. The accuracy of the prediction of belonging to EG1 is 70.8%, to EG2 is 41.0%, therefore, positive answers to this question are very character-

istic for the first group, but negative answers do not give reason to assume that the student belongs to EG2. The overall accuracy of the prediction is 54.9%. There were no significant differences between the distributions of answers on the predictor question. Compared to EG2, EG1 students deny the benefit of the course in 5.6% vs 9.8% of cases, while the answer “rather yes” is given by 23.6% vs 31.1%, and the absolutely affirmative answer is “yes” 70, 8% vs 59.0% ($p = 0,103$).

Discussions

The digital transformation of education causes a lot of discussion, and there are strong beliefs and even stereotypes about its individual aspects. For example, it is believed that young people adapt more easily to online learning, while people of adulthood experience more difficulties and are more critical of it. This is all the more strange since the professional activities of the vast majority of students in master’s programs and in the second higher education programs are directly connected with the computer. It is also widely believed that when studying in e-courses, students lose the unique opportunity of personal contacts with the teacher. Whether this is so from the point of view of more experienced students of EG1, on the one hand, and youth of EG2, on the other?

When asked about the **possible difficulties and benefits of studying at the EC**, the students of the EG2 express a number of characteristic opinions that make it possible to predict their belonging to this group with high accuracy (74.3%). Compared with the EG1 group, it’s a little more difficult for them to get used to studying in BL-format (however, less than 30% of them experience difficulties), they more often rate tests as not helping or rather not helping to assimilate the e-course content (but less than 20%). Somewhat more often, they don’t quite agree that the EC allows them to track their individual trajectory (but the share of such opinions is insignificant and makes up only about 6%), and they

somewhat more often — by about 10% — deny the deficiency of contacts with the teacher (in ca 70% of cases). We note that the prevalence of opposing estimates, strictly speaking, cannot be considered characteristic of the EG1 group, since the forecast accuracy for it was less than 50%. In general, the vast majority of students of both categories did not have significant difficulties, the tests were useful for better assimilation of the learning content, the EC really allowed them to track their individual trajectory, and there were enough personal contacts with the teacher. This is in good agreement with our previous study [13] and refutes the prevailing stereotypes.

The questions of the second group **about the attitude towards studying at the ECs** made it possible to single out a set of predictor opinions typical of both EG1 and EG2. This group of questions also checks a number of stereotypical opinions about the lower quality of online education in a BL-format compared to traditional full-time and about the useless introduction of e-courses as a tribute to fashion. In addition, almost all EG1 students are employed, and many EG2 students also work part-time and cannot attend full-time classes. Unsuccessful students often cite this argument as a justification, and not only administrative control measures are required, but also other constructive solutions, such as e-courses and online learning. Finally, the attitude to mathematics is also a cause for controversy in the university environment. Among some professors, unfortunately, there is still an opinion that a psychologist does not need mathematics, psychology students are not able to learn it even in applied aspects, and a course of mathematical methods in psychology is “an inevitable evil.” Let’s look at all this through the eyes of students.

According to the findings of our study, students of EG1 as compared with EG2 in almost 94% of cases do not agree that ECs reduce the education quality (this is 10% more), and also more unanimously —

more than 84% against 70% — support the opinion that using of ECs is a modern need. About 75% of them, compared with almost 80% of EG1 students, agree that it is high time to use ECs, and students of both groups almost unanimously (more than 95%) agree that online-learning solves the problems of employed students, and the differences here are only in response modalities, so as youth more often gives the confident answer “yes”, and more mature students — the more restrained one “rather, yes”. And the most encouraging is that the EC, dealing with mathematical methods in psycho-educational researches — and this is far from the favorite topic among psychology students — was liked by 93% of EG1 students and almost 90% of EG2 students, which also contradicts the prevailing stereotypes.

The 3rd group of very important **questions concerning the independence of EC reporting and dishonest strategies in online learning** turned out to be the least informative and allowed to single out only one predictor statement — “There will still be students who use dishonest strategies in testing,” which shows almost complete unanimity. The agreement with this opinion is typical for both categories of students, but in the EG1 disagree about 26%, and in the EG2 only ca 11%. If the agreement allows one to predict with high accuracy the membership in the EG2 group, then the disagreement cannot be considered characteristic of the EG1 group, since the forecast accuracy is very low. It’s hard to say what it is: a reflection of life experience or the justification of their own dishonest strategies of passing tests. The problem of dishonest strategies requires further investigation.

The questions of the 4th group concerned **the independence of the course content study and involvement in the educational process**. They made it possible to single out a set of opinions that are quite characteristic for each of the 2 categories of students. Students of EG1, in contrast to EG2, are more likely to argue that they studied much

more intensively in EC-seminars (or webinars) than at full-time ones and immediately got involved in the learning process, and also less often agree to replace face-to-face lessons with webinars. At the same time, they somewhat less often confirm that they helped classmates at the seminars, but here the differences are only in response modalities and very small percentage differences. Indeed, 65% of EG1 students and 52% of EG2 ones confirm more intensive activity at the EC-seminars, and do not agree to replace the seminars with webinars 82% and 60%, respectively. Belated inclusion in the educational process from ca the middle of the course is confirmed by 42% of the EG1 and 57% of the EG2. Helping classmates at workshops confirms about two-thirds in both groups. Indeed, the seminars when conducting in the BL-format are becoming much more intensive, we communicated with the audience in active and interactive modes, facilitating their independent activity with the EC-resources and the SPSS. But if the attendance at the seminars in EG1 was very high, then in EG2 there were more missed classes, as attendance was no longer taken into account when setting the credit for the course, and we did not use this administrative lever. It is also possible that it is really more convenient for students of the first higher education to study the course more independently, and more mature students need more help from the teacher. In addition, students should begin to study the course in a timely manner, and the teacher needs to provide this.

Finally, in the 5th group of questions evaluating the practical use of the e-course of mathematical methods in psychology and education, only one question became a predictor: "The information of this EC will help me use mathematical methods to analyze empirical data in my graduation qualification paper". The predominant agreement with him is typical for students of EG1, but the disagreement does not give reason to assume that the student belongs to EG2. The difference in answers here is only in modalities,

since more than 94% of the first group and 90% of the second one confirm the practical usefulness of the course, and this is very encouraging.

Conclusions

The study hypothesis was not confirmed. In general, the vast majority of students of both categories did not have significant difficulties in studying the EC in BL-format, the tests were useful for better mastering the content, the EC really allowed them to track their individual trajectory, and personal contacts with the teacher were sufficient. This refutes the prevailing stereotypes.

When asked about the possible difficulties and benefits of studying at the EC, students of the EG2 group express a number of characteristic opinions that make it possible to predict with high accuracy (74.3%) their membership in this group, but the prevalence of opposing assessments cannot be considered characteristic of the EG1 group, because the prediction accuracy for it was less than 50%.

The questions of the 2nd group about the attitude to studying at the EC made it possible to establish a set of predictor opinions that would make it possible to accurately predict whether a student belongs to one of the categories examined. EG1 students, in comparison with the EG2 ones, almost unanimously disagree that ECs reduce the quality of education, but agree that the use of online-courses is a modern need, and a little less agree that it is high time to introduce them. Almost all students in both groups believe that the EC solves the problems of employed students. Both categories of students overwhelmingly claim that they liked this EC, dealing with mathematical methods in psychological and educational researches. The differences are only in the modalities of the answers, which follow the same general trends, and this also refutes stereotypes.

The third group of very important questions about the independence of EC-reporting and dishonest strategies in online learn-

ing turned out to be the least informative and allowed to single out only one predictor statement on which almost complete unanimity is observed. The problem of dishonest strategies requires further investigation.

Questions of the 4th group concerning the independence of the study of content and involvement in the educational process using the e-course made it possible to single out a set of opinions that are quite characteristic for each of the 2 categories of students. EG1 students, unlike EG2 ones, are more likely to argue that they studied much more intensively in seminars at EC than in tradi-

tional full-time format and immediately got involved in the course, and also less often agree to replace face-to-face classes with webinars. They are less likely to confirm that they helped classmates at the seminars, but here the differences are only in response modalities.

In the last group of questions about the practical usefulness of the e-course of mathematical methods in psycho-educational researches, only one question became a predictor. The difference in answers here is only in modalities, since almost all confirm the practical benefits of the course.

References

1. Dmitrievskaya N.A., Goremykina G.I. Modelirovanie sistemy upravleniya po rezul'tatam deyatelnosti smart-universiteta v usloviyakh tsifrovizatsii ekonomiki i obshchestva [Modeling a management system based on the results of a smart university in the context of digitalization of the economy and society]. *Materialy mezhdunarodnoi konferentsii "E-Learning Stakeholders and Researchers Summit"* (g. Moskva, 5—6 dekabrya 2018 g.). [Materials of the international conference "E-Learning Stakeholders and Researchers Summit"]. Moscow: Publ. Izd. dom Vyshei shkoly ekonomiki, 2018, pp. 39—46. (In Russ.).
2. Ispol'zovanie elektronnoho obucheniya v obrazovatel'nom protsesse: problemy i perspektivy / Dvoryanchikov N.V., Kalashnikova T.V., Pechnikova L.S., Frolova N.V. // *Psikhologicheskaya nauka i obrazovanie=Psychological Science and Education*, 2016. Vol. 21, no. 2, pp. 76—83. DOI:10.17759/pse.201621020 (In Russ.).
3. Klimenskikh M.V., Mal'tsev A.V., Khalin A.V. Motivatsionnye i kognitivnye osobennosti studentov — slushatelei onlain-kursov [Motivational and cognitive features of students studying online-courses]. *Materialy mezhdunarodnoi konferentsii "E-Learning Stakeholders and Researchers Summit"* (g. Moskva, 5—6 dekabrya 2018 g.). [Materials of the international conference "E-Learning Stakeholders and Researchers Summit"]. Moscow: Publ. Izd. dom Vyshei shkoly ekonomiki, 2018, pp. 146—154. (In Russ.).
4. Kochetkova I.S., Terskaya L.A. Opyt ispol'zovaniya sistemy elektronnoho obucheniya (Moodle) v obshchenauchnykh i spetsial'nykh distsiplinakh [The experience of using the e-learning system (Moodle) in general scientific and special disciplines]. *Azimuth nauchnykh issledovaniy: pedagogika i psikhologiya=Azimuth of scientific researches: pedagogy and psychology*, 2017. Vol. 4, no. 21, pp. 93—97. Available at: <https://cyberleninka.ru/article/n/opyt-ispolzovaniya-sistemy-elektronnoho-obucheniya-moodle-v-obshchenauchnykh-i-spetsialnykh-distciplinakh> (Accessed 02.04.2020). (In Russ.).
5. Lomonosova N.V. K voprosu ob ispol'zovanii sistemy smeshannogo obucheniya studentami vuzov [On the use of blended learning system by university students]. *Vestnik Tomskogo gosudarstvennogo pedagogicheskogo universiteta=Bulletin of Tomsk State Pedagogical University*, 2017. Vol. 5, no. 182, pp. 122—126. (In Russ.).
6. Margolis A.A. Chto smeshivaet smeshannoe obuchenie? [What Kind of Blending Makes Blended Learning?]. *Psikhologicheskaya nauka i obrazovanie=Psychological Science and Education*, 2018. Vol. 23, no. 3, pp. 5—19. DOI:10.17759/pse.2018230301. (In Russ.).
7. Marshanskaya L.V., Lesnichenko G.I. Informatizatsiya obrazovaniya kak odno iz prioritnykh napravleniy gosudarstvennoi politiki v oblasti obrazovaniya [Informatization of education as one of the priority areas of state policy in the field of education]. *Nauka i obrazovanie segodnya=Science and education today*, 2018. Vol. 3, no. 26, pp. 62—67. (In Russ.).
8. Maslova L.A. MOOK v klassicheskikh universitetakh. Spras na MOOK so storony molodezhi 18—25 let [MOOCs in classical universities. Demand for MOOCs from youth 18-25 years old]. *Materialy mezhdunarodnoi konferentsii "E-Learning Stakeholders and Researchers Summit"* (g. Moskva, 5—6 dekabrya 2018 g.). [Materials of the international conference "E-Learning Stakeholders and Researchers Summit"]. Moscow: Publ. Izd. dom Vyshei shkoly ekonomiki, 2018, pp. 23—38. (In Russ.).
9. Mullagaliev N.A., Urazlina N.V. Ob otnoshenii studentov k vvedeniyu elementov distantsionnogo obucheniya v vuz [On the attitude of students to the introduction of distance learning elements in a university]. *Innovatsionnaya nauka=Innovation Science*, 2017, no. 1, pp. 188—191. (In Russ.).
10. Nasledov A.D. IBM SPSS Statistics 20 i AMOS: professional'nyi statisticheskii analiz dannykh [IBM

SPSS Statistics 20 and AMOS: Professional Statistical Data Analysis]. Saint-Petersburg: Piter, 2013. 416 p. (In Russ.).

11. Roshchina Ya.M., Roshchin S.Yu., Rudakov V.N. Spros na massovye otkrytye onlain-kursy (MOOC): opyt rossiiskogo obrazovaniya [Demand for Mass Open Online Courses (MOOC): Russian Education Experience]. *Voprosy obrazovaniya=Education Issues*, 2018, no. 1, pp. 174—199. DOI:10.17323/1814-9545-2018-1-174-199 (In Russ.).

12. Sorokova M.G. Matematicheskie metody v psikhologo-pedagogicheskikh issledovaniyakh : Uchebnoe posobie [Mathematical methods in psycho-educational researches]. Moscow: Publ. Neolit, 2020. 216 p. DOI:10.17759/psychlib/978-5-6043562-0-3 (In Russ., in Engl.).

13. Sorokova M.G. Elektronnyi kurs kak tsifrovoy obrazovatel'nyi resurs smeshannogo obucheniya v usloviyakh vysshego obrazovaniya [E-Course as Blended Learning Digital Educational Resource in University]. *Psikhologicheskaya nauka i obrazovanie=Psychological Science and Education*, 2020. Vol. 25, no. 1, pp. 36—50. DOI:10.17759/pse.2020250104 (In Russ., in Engl.)

14. Khazan M.Yu. Razvitiye umenii i navykov dlya sozdaniya onlain-kurosov: professional'nyi opyt i tvorcheskoe nachalo [Developing skills for creating online courses: professional experience and creativity]. Materialy mezhdunarodnoi konferentsii "E-Learning Stakeholders and Researchers Summit" (g. Moskva, 5—6 dekabrya 2018 g.). [Materials of the international conference "E-Learning Stakeholders and Researchers Summit"]. Moscow: Publ. Izd. dom Vyshei shkoly ekonomiki, 2018, pp. 140—145. (In Russ.).

15. Chkhutiashvili L.V. Gosudarstvennaya politika v sfere onlain-obrazovaniya [State policy in the field

of online-education]. Materialy mezhdunarodnoi konferentsii "E-Learning Stakeholders and Researchers Summit" (g. Moskva, 5—6 dekabrya 2018 g.). [Materials of the international conference "E-Learning Stakeholders and Researchers Summit"]. Moscow: Publ. Izd. dom Vyshei shkoly ekonomiki, 2018, pp. 18—21. (In Russ.).

16. Arif S., Omar I. Effectiveness of Flipped Classroom in Teaching Basic English Courses. *Yiiksekögretim Dergisi*, 2019. Vol. 9, no. 3, pp. 279—289. DOI:10.2399/yod.19.003

17. Kuhn S., Frankenhauser S., Tolks D. Digitale Lehr- und Lernangebote in der medizinischen Ausbildung. *Bundesgesundheitsbl*, 2018. Vol. 61, pp. 201—209. DOI:10.1007/s00103-017-2673-z

18. Rajaram K. Flipped classrooms: Scaffolding support system with real-time learning interventions. *Asian Journal of the Scholarship of Teaching and Learning*, 2019. Vol. 9, no. 1, pp. 30—58. Available at: <http://www.nus.edu.sg/cdtl/engagement/publications/ajsotl-home/archive-of-past-issues/v9n1/flipped-classrooms-providing-a-scaffolding-support-system-with-real-time-learning-interventions> (Accessed 02.04.2020).

19. Røe Y., Rowe M., Ødegaard N.B. et al. Learning with technology in physiotherapy education: design, implementation and evaluation of a flipped classroom teaching approach. *BMC Med Educ*, 2019. Vol. 19, 291. DOI:10.1186/s12909-019-1728-2

20. Wu M., et al. Instructional Video Properties That Foster Student Engagement, Learning, and Performance in Online Environments. Materialy mezhdunarodnoi konferentsii "E-Learning Stakeholders and Researchers Summit" (g. Moskva, 5—6 dekabrya 2018 g.). [Materials of the international conference "E-Learning Stakeholders and Researchers Summit"]. Moscow: Publ. Izd. dom Vyshei shkoly ekonomiki, 2018, pp. 9—13. (In Engl.).

Литература

1. Дмитриевская Н.А., Горемыкина Г.И. Моделирование системы управления по результатам деятельности смарт-университета в условиях цифровизации экономики и общества // Материалы международной конференции «E-Learning Stakeholders and Researchers Summit» (г. Москва, 5—6 декабря 2018 г.). М.: Изд. дом Высшей школы экономики, 2018. С. 39—46.

2. Использование электронного обучения в образовательном процессе: проблемы и перспективы / Дворянчиков Н.В., Калашникова Т.В., Печникова Л.С., Фролова Н.В. // Психологическая наука и образование. 2016. Том 21. № 2. С. 76—83. DOI:10.17759/pse.201621020

3. Клименских М.В., Мальцев А.В., Халфин А.В. Мотивационные и когнитивные особенности студентов — слушателей онлайн-курсов // Материалы международной конференции «E-Learning Stakeholders and Researchers Summit»

(г. Москва, 5—6 декабря 2018 г.). М.: Изд. дом Высшей школы экономики, 2018. С. 146—154.

4. Кочеткова И.С., Терская Л.А. Опыт использования системы электронного обучения (Moodle) в общенаучных и специальных дисциплинах [Электронный ресурс] // Азимут научных исследований: педагогика и психология. 2017. Том 4. № 21. С. 93—97. URL: <https://cyberleninka.ru/article/n/opyt-ispolzovaniya-sistemy-elektronnogobucheniya-moodle-v-obschenauchnyh-i-spetsialnyhdistsiplinakh> (дата обращения: 02.04.2020).

5. Ломоносова Н.В. К вопросу об использовании системы смешанного обучения студентами вузов // Вестник Томского государственного педагогического университета. 2017. Том 5. № 182. С. 122—126.

6. Марголис А.А. Что смешивает смешанное обучение? // Психологическая наука и образование. 2018. Том 23. № 3. С. 5—19. DOI:10.17759/pse.2018230301

7. *Маршанская Л.В., Лесниченко Г.И.* Информатизация образования как одно из приоритетных направлений государственной политики в области образования // *Наука и образование сегодня*. 2018. Том 3. № 26. С. 62—67.
8. *Маслова Л.А.* MOOK в классических университетах. Спрос на MOOK со стороны молодежи 18—25 лет // *Материалы международной конференции «E-Learning Stakeholders and Researchers Summit»* (г. Москва, 5—6 декабря 2018 г.). М.: Изд. дом Высшей школы экономики, 2018. С. 23—38.
9. *Муллагалиев Н.А., Уразлина Н.В.* Об отношении студентов к введению элементов дистанционного обучения в вузе // *Инновационная наука*. 2017. № 1. С. 188—191.
10. *Наследов А.Д.* IBM SPSS Statistics 20 и AMOS: профессиональный статистический анализ данных. СПб.: Питер, 2013. 416 с.
11. *Рощина Я.М., Рошин С.Ю., Рудаков В.Н.* Спрос на массовые открытые онлайн-курсы (MOOC): опыт российского образования // *Вопросы образования*. 2018. № 1. С. 174—199. DOI:10.17323/1814-9545-2018-1-174-199
12. *Сорокова М.Г.* Математические методы в психолого-педагогических исследованиях: Учебное пособие. М.: Неолит, 2020. 216 с. DOI:10.17759/psychlib/978-5-6043562-0-3
13. *Сорокова М.Г.* Электронный курс как цифровой образовательный ресурс смешанного обучения в условиях высшего образования // *Психологическая наука и образование*. 2020. Том 25. № 1. С. 36—50. DOI:10.17759/pse.2020250104
14. *Хазан М.Ю.* Развитие умений и навыков для создания онлайн-курсов: профессиональный опыт и творческое начало // *Материалы международной конференции «E-Learning Stakeholders and Researchers Summit»* (г. Москва, 5—6 декабря 2018 г.). М.: Изд. дом Высшей школы экономики, 2018. С. 140—145.
15. *Чхутиашвили Л.В.* Государственная политика в сфере онлайн-образования // *Материалы международной конференции «E-Learning Stakeholders and Researchers Summit»* (г. Москва, 5—6 декабря 2018 г.). М.: Изд. дом Высшей школы экономики, 2018. С. 18—21.
16. *Arif S., Omar I.* Effectiveness of Flipped Classroom in Teaching Basic English Courses // *Yükseköğretim Dergisi*. 2019. Vol. 9. № 3. P. 279—289. DOI:10.2399/yod.19.003
17. *Kuhn S., Frankenhauser S., Tolks D.* Digitale Lehr- und Lernangebote in der medizinischen Ausbildung // *Bundesgesundheitsbl.* 2018. Vol. 61. P. 201—209. DOI:10.1007/s00103-017-2673-z
18. *Rajaram K.* Flipped classrooms: Scaffolding support system with real-time learning interventions [Электронный ресурс] // *Asian Journal of the Scholarship of Teaching and Learning*. 2019. Vol. 9. № 1. P. 30—58. Available at: <http://www.nus.edu.sg/cdtl/engagement/publications/ajsotl-home/archive-of-past-issues/v9n1/flipped-classrooms-providing-a-scaffolding-support-system-with-real-time-learning-interventions> (Accessed 02.04.2020).
19. *Røe Y., Rowe M., Ødegaard N.B. et al.* Learning with technology in physiotherapy education: design, implementation and evaluation of a flipped classroom teaching approach // *BMC Med Educ*. 2019. Vol. 19, 291. DOI:10.1186/s12909-019-1728-2
20. *Wu M. et al.* Instructional Video Properties That Foster Student Engagement, Learning, and Performance in Online Environments // *Материалы международной конференции «E-Learning Stakeholders and Researchers Summit»* (г. Москва, 5—6 декабря 2018 г.). М.: Изд. дом Высшей школы экономики, 2018. С. 9—13.

Information about the authors

Marina G. Sorokova, PhD (Education), PhD (Physics and Mathematics), Professor, Chair of Applied Mathematics, Faculty of Information Technology, Moscow State University of Psychology & Education, Moscow, Russia, ORCID: <http://orcid.org/0000-0002-1000-6487>, e-mail: sorokovamg@mgppu.ru

Информация об авторах

Сорокова Марина Геннадьевна, доктор педагогических наук, кандидат физико-математических наук, профессор кафедры Прикладной математики факультета Информационных технологий, ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация, ORCID: <http://orcid.org/0000-0002-1000-6487>, e-mail: sorokovamg@mgppu.ru

Получена 03.04.2020

Принята в печать 20.04.2020

Received 03.04.2020

Accepted 20.04.2020