

Determining the Readiness Status of University Students in STEM Education and Distance Education Course

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Natalia A. Zaitseva^{1(✉)}, Zhanna M. Sizova², Vera A. Chauzova³, Anna A. Larionova⁴

¹ Plekhanov Russian University of Economics, Moscow, Russia

² I.M. Sechenov First Moscow State Medical University (Sechenov University), Moscow, Russia

³ Peoples' Friendship University of Russia (RUDN University), Moscow, Russia

⁴ Financial University under the Government of the Russian Federation, Moscow, Russia
zaitseva-itig@mail.ru

Abstract—This research, Science, Technology, Engineering, Mathematics (STEM) and remote training on information given and university students in STEM, and distance education classes integration on the emphasis and work, STEM and remote training on course to integration on the information given is intended. On the other hand, STEM education and distance education with related research support in order to ready distance education presence, levels were investigated. The study was applied during the 2020–2021 fall semester. The quantitative research method was used in the research. This research study comprises groups that have been created by 520 4th grade reading Science Information Teacher candidates of universities. University Students 'STEM and Distance Education Ready presence, Survey' was applied. Data and survey were collected online. The collected data were analysed using Statistical Package for the Social Sciences software. Research on the results based on students' training and daily lives for technology support needs that heard, their needs education and their lives ease it provides to the results, further STEM and related studies in the literature even more writing space font contribution will provide, also STEM Education 'ready presence, status, remote training ready presence, status on by more high that the result was reached.

Keywords—STEM, distance education integration, Internet use, ready presence

1 Introduction

Today, we discuss 21st century competencies and expertise in all areas of life of a particular community, say student community [22]. Conditions in the developing world and constantly renewed who can answer the community, education of students the level of readiness rather than faced effective during the solution of the problem can use it is composed of so on [1]. Accordingly, students have a very different view of their problem-solving disciplines they are expected to use and they experience different kinds of difficulties in the process of the acquisition. Individual knowledge, interdisciplinary

skills, and perspectives in the field of STEM (Science, Technology, Engineering, Mathematics), economic development and scientific leadership are regarded an important tool [12]. The joint work in the fields of science, mathematics, engineering and technology in the past few years have given rise to a umbrella term “STEM” education, and these disciplines possess an educational movement that is associated with each other. In the early 2000s STEM education originated, and by mid-2000 the National Science Foundation was formed and its big budget was funded [4]. STEM education focuses mainly on the discipline of science and mathematics together with technology and engineering fields [21]. STEM education projects were supported although they should have been on the K-12 levels, especially the math and science fields in the foreground has been. However, a successful STEM education aims at providing the following skills to its users: problem-solving, creative and innovative ideas, take a critical look at challenges. In line with these objectives, only those who focus in the fields of math and science in the future become creative and innovative problem solvers—researchers, engineers and designers [2].

Therefore, the first priority is to study the details of STEM education in order to have proper understanding of STEM. The requirements of age and opportunity in education considering equality, students, teachers and administrators traditional school education is limited between the walls it should not be. Through distance education to be presented STEM education the school walls to ensure equality of opportunity and to exceed will make way [7]. Studies on STEM education although increasing STEM remote yet work on education is in its infancy stage. However, these resources are not used effectively because content and structure the needs of students, the curriculum, and according to research updated has been developed [15]. Remote STEM education reached in relation to the number of the source of the scarcity working in this area the need reveals. In addition, the sustainability of STEM education, which is disseminated from a distance, and how it will be provided is a problem that needs to be discussed. [14]. Therefore, the STEM of education students, teachers and the career development of managers and countries is a crucial need for their future considering STEM education detailed with STEM education components and remote is an issue that should be studied.

This information as well as for teaching purposes use the dimensions of the most beautiful situated between distance education today it would end the usefulness of importance in a training environment like indispensable as sources of students replaces [6]. In the digital age technological events, on the request of individuals has a significant effect [27]. At the same time lifelong learning and problem-solving great emphasis on technology skills moves [24]. Technology Fast with the development of education structure and its importance make it more meaningful for students it is found. Teacher distance education environment candidates to integrate the lessons of the training more make it understandable and meaningful brings [18]. When studies are examined, remote Training teacher in many educational settings candidates, support on the subject being learned is [3]. In this sense, the problem with distance education research given instruction, students in distance education the views towards the constitute.

In short distance education for teacher candidates preparing learning materials for remote the process of course development is a description of the institution [16]. Distance education, resident education the state is moving with respect to place and time from last teacher candidates and for the people an improved system [8]. students continue their education in almost every field thanks to this system [5]. Global when Distance Education was in the hands of as Internet-based, technologically advanced tools and with the equipment away from each other, teacher candidates Interactive Data Exchange and the training of staff presence can be defined as [10]. The same is the most basic and preferred sources of distance education at the time, cloud technology, cloud technology with stem it is most commonly used when combined as a type of technology that replaced today received [19]. Technology by making use of the facilities, the teacher the candidate and one of the teachers for distance education in the environment in different ways against they were brought face to face education in a planned the education system has created.

The future leaders and students are now more qualified so equipped, open to learning and innovations like this always in order to keep up issues should be given a place in the literature it can be said.

1.1 Related research

Poyraz and Kumtepe [17] in Turkey ‘An example of STEM education and sustainable Distance education for STEM education titled’ his work done, work in STEM education, students obtain information and of skills from an interdisciplinary perspective Contained in Bloom’s taxonomy, synthesis and evaluation of intended to target the steps to upgrade, as a result, STEM education and design remote the findings also applications for the right of the subject immediately the opinions of all relevant stakeholders this study, which was conducted by our country an example of this applied to STEM education and education for remote execution of multi - way that includes evaluations concluded have reached.

In Makamure and Tsakeni [13], ordinary level mathematics and science teaching was investigated in line with the STEM education goals provided by the Internet of Things in online classrooms. As a result, it was concluded that teachers revealed their experience with this transition and that they chose specific Web 2.0 tools to create online classrooms. Also, mobile instant messengers have proven to be a popular choice for being inexpensive, user-friendly, temporal, and multimodal. Finally, he revealed that teachers had difficulty in adapting hands-on activities to fit online teaching, resulting in the use of teacher-centered approaches.

Tekin Poyraz [22] in STEM education in examining the application of the Kayseri province and the the applicability of remote STEM education titled’ in the study, STEM education, students an interdisciplinary overview of obtained knowledge and skills pain contained in Bloom's taxonomy and synthesis the evaluation steps and aims to raise in summary, as a result, the remote design STEM education and practices the findings of reached in different environments, different field (distance education, STEM education, science, etc.) expert participants this study, which was conducted in our country an

example of STEM education, applied and expert opinions on remote STEM education evaluations included versatile the conclusion has been reached.

In Derin et al. (2017) study titled [26] ‘STEM Education Attitude Scale’, it was aimed to develop a scale that measures the attitudes of adults studying in the fields of science and mathematics towards the STEM education approach. It was applied to a total of 300 teacher candidates studying at universities. The 2-factor structure of the scale was confirmed as a result of the confirmatory and exploratory factor analyzes conducted to test whether the scale meets the theory. As a result of the analyzes made for the reliability of the scale, satisfactory levels of alpha measurements were found for both dimensions and general of the scale. As a result, the valid and reliable structure of the adapted version of the scale has been confirmed.

In Ates and Altun's (2008) study titled ‘Investigation of Computer Teacher Candidates' [25] Attitudes towards Distance Education in terms of Various Variables’, it was determined that the attitudes of 3rd and 4th grade students in the Department of Computer Education and Instructional Technologies (BOTE) towards distance education (UEYT). The level of distance education, computer use experience, perceived computer skills and learning styles, as a result, the UEYT does not differ significantly according to gender and class, The participants' previous distance education status, computer use experiences and perceived computer skills. He found that it significantly affects.

Güneş [9] aimed to reveal students' perceptions about asynchronous distance education (ADL) and blended learning (BL) in his [9] study. As a result, it was found that students in the ADL group were not satisfied with being taught remotely. On the other hand, the BL process was preferred by all BL students included in the interviews.

1.2 Purpose of the study

This study, research, and distance education request information and courses will be given on the integration of it is intended to give you information.

Set general purpose, answers to the following questions he's been checked out.

1. Students how to use the internet in the day?
2. Students how to use the computer in the day?
3. Students The slope of the Remote request and university courses what is the status of integration?
4. What is the readiness of university students for distance education?

2 Method and materials

Most of the styles are intuitive. However, we invite you to read carefully the brief description below.

2.1 Research model

Research students and quantitative research methods Information about distance education and STEM status according to the analysis of visions of it is designed. Quantitative Research method: the events and objectification facts, the observation can be made and, at the same time and can measure expressed as mathematical operations research quantitative research type is called. In quantitative research the goal behaviors of the people within the community is to observe. Persons to achieve this result survey, scale, etc. survey results applied identifies and quantifies specific were transferred to a computer the results we achieve and in the form of tables.

2.2 Instruments

Personal Information Form (demographic data). the personal information form; gender, college, age, class, day in Internet usage, within days computer use, research, and distance education related to the information has been given.

STEM and Distance Education Readiness Survey. distance education students about STEM previously in order to take their views developed a 5-point Likert type questionnaire was used. The survey items related to education and research with 32 Remote comprises. The scale 32 added on consists of a positive statement. In an article 1 points “Definitely I do not agree” expression 5 points while ‘I definitely agree’ refers to.

2.3 Data analysis

Survey along with the collected data, Statistical Package for the Social Sciences program IBM 24.0 were analyzed by using. The results of the analysis percentage frequency and descriptive, Kruskal Wallis H-Test methods has been given.

2.4 Participants

Research random college students 520 student’s student volunteer participated. 2020 research – 2021 reviewed in the autumn term.

Gender. Gender of the students that participated in the research Table 1 distribution has been given.

Table 1, as shown in study the group of students 57.91% of (301 persons) were male, and 42.1% (219 persons) female students constitutes. Gender Section the findings, the actual gender distribution reflects.

Table 1. Participated in the survey students sex distribution

Sex	<i>f</i>	%
Male	301	57.9
Women	219	42.1
Total	520	100.0

Age. Surveyed students live Table 2 distribution has been given.

Table 2. Participated in the survey students age distribution

Age	<i>f</i>	%
18–24	380	73.1
25–32	120	23.1
33–33+	20	3.8
Total	520	100.0

Table 2. students the age distribution shows. This according to the distribution, the 18–24-year-old 73.1% of the students (380 people), 25–32 - year-old students of 23.1% (120), 33 and 33-year-old students over the age of 3.8% (20 people)’ is observed. Age in the section on findings, the actual age distribution reflects.

Use the Internet in the day. Research students participating in the day of Table 3 conditions of Internet use has been given.

Table 3. Students the distribution of Internet usage within

Date Internet usage in	<i>f</i>	%
1–3 hours	100	19.2
4–6 hours	106	20.4
7–9 hours	82	15.8
9 and above	232	44.6
Total	520	100.0

Table 3. students surveyed during the day internet usage information seen. 1–3 based on this distribution students who use the Internet for hours as percentage of 19.2% (100 people) Students who use the Internet for 4–6 hours by 20.4% (106 people) Students who use the Internet for hours and 7%–9% of 15.8 (82 people) 9 hours and above of students who use the Internet 44.6% (232 people) has been identified as

Day computer use. Research students participating in the day of in Table 4 the conditions of computer use has been given.

Table 4. Students’ distribution of computer usage in

Day in computer usage	<i>f</i>	%
1–3 hours	33	21.0
4–6 hours	162	19.6
7–9 hours	135	15.2
9 and above	190	44.2
Total	520	100.0

Table Students surveyed at 4 during the day computer usage information seen. 1–3 based on this distribution students who use the computer for hours, 21.0% (33 people) Students who use the computer for 4–6 hours of of 19.6% (162 person), students who

use the computer for 7–9 hours 44.2% (135 people), and later uses the computer for 7 hours students 44.2% to (190 people) has been identified as.

3 Result

This the chapter on the request of the students and remote the slope of the state of integration in their university courses the objectives on determination regarding the findings of results and interpretations have been given.

3.1 Determination of integration status of university students in STEM and distance education courses

On the stem of university students of self-sufficiency results descriptive statistics related

Table 5. seen in the University of the stem student’s self-sufficiency the results for the determination is located. The most significant difference to be seen in expressions though the most prominent of the University students the expression ‘stem the contents of a file an electronic (sound, music, text, etc.) can I view’ $M =$ an average of 3.83 is concluded. Also, the most prominent college students the expression ‘from the stem easily from the computer training I can use’ $M = 3.51$ average seen. In addition, the University students from the most obvious expression of the ‘STEM I would be happy to take the training.’ $M =$ an average of 3.45 these findings are obtained with. STEM college students’ self-sufficiency the determination of the results for the high that can be said.

Descriptive statistics results on Internet self-efficacy of university students

Table 5. Descriptive statistics results on STEM self-efficacy of university students

No.	Substances	M	SD
<i>STEM – self-sufficiency</i>			
1)	I can easily use STEM Education from the computer.	3.51	1.359
2)	I can view the contents (sound, music, text, etc.) of an electronic STEM file.	3.83	1.331
3)	I can solve the problems I encounter during STEM Education.	3.16	1.217
4)	Taking STEM Education makes me happy.	3.45	1.312
5)	I can easily use STEM application software (editor, design, etc.) whenever I need it.	3.30	1.307

Table At 6: Deemed University students the internet self-efficacy the results for the determination is located. The most significant difference to be seen in expressions though the most prominent of the University students the expression ‘from search engines (Google, Yandex etc.) I can easily use.’ $M =$ an average of 4.42 that is concluded. Also, the most obvious expression of college students from ‘Their web browser (Internet Explorer, Google Chrome, etc.) I can easily use.’ $M =$ is an average of 4.30. Get these findings with college students Internet self-efficacy for the determination the results can be said to be high.

Descriptive statistics results on distance education self-efficacy of university students

Table 6. Descriptive statistics results on the Internet self-efficacy of university students

No.	Substances	M	SD
<i>Internet - self-efficacy</i>			
1)	I can use web browsers (Internet Explorer, Google Chrome etc.) easily.	4.30	1.126
2)	I can easily use search engines (Google, Yandex etc.).	4.42	1.037
3)	I can download a file from the Internet to my computer.	4.19	1.146
4)	I can easily access the information I am looking for on the Internet.	4.28	1.054
5)	I can easily access the information I am looking for about STEM on the Internet.	4.37	1.038

Table 7 seen in the University of students remote training self-efficacy the results for the determination is located. The most significant difference to be seen in expressions though the most prominent of the University student the expression ‘distance education in the internet environment Applications (Skype, Google hangout, Google Backes, Adobe Connect, Zoom, Microsoft Teams, etc.) easily voice or video I can communicate.’ $M =$ An average of 4.16 is concluded. Also, the most prominent college students from the expression ‘distance education in communication myself I can easily express (emotions, humor, etc.).’ $M =$ An average of 4.16. Get these findings with college students Remote self-sufficiency for the determination of the results can be said to be high.

Descriptive statistics results on university students' self-learning competence

Table 7. Distance education of college students' self-results descriptive statistics competency

No.	Substances	M	SD
<i>Distance education self-efficacy</i>			
1)	I can easily use Distance Education tools (e-mail, discussion platforms, Adobe Connect, Microsoft Teams, etc.) to communicate effectively with people.	4.09	1.242
2)	I can easily ask questions in distance education discussion environments.	3.81	1.198
3)	I can easily express myself in distance education communication (emotions, jokes, etc.).	4.15	1.105
4)	I can ask for help by using Remote Education tools (discussion sites, social networks, e-mail, etc.)	4.01	1.215
5)	I can easily communicate with distance education applications (Skype, Google hangout, Google Meet, Adobe Connect, Zoom, Microsoft Teams etc.) in Internet environments by voice or video.	4.16	1.172

Table 8 shows the results for determining the self-learning competence of the University students. Although there is a significant difference in most of the statements, one of the most prominent statements of university students is ‘I make my study plan myself while learning.’ $M = 4.07$ average result has been reached. In addition, one of the most prominent expressions of University Students is ‘I believe that I am responsible for my own learning.’ It appears to be an average of $M = 4.06$. With these findings, it can be said that the results regarding the determination of self-learning competence of University Students are high.

Table 8. Descriptive statistics results on university students' self-learning competence

No.	Substances	M	SD
<i>Self-learning</i>			
1)	I identify my learning deficiencies.	3.88	1.069
2)	I set my learning goals myself.	3.98	1.087
3)	While learning, I make my study plan myself.	4.07	1.061
4)	While learning, I apply my own study plan completely.	3.73	1.020
5)	I arrange my current study plan according to the new conditions.	3.91	1.045
6)	I determine the appropriate resources and tools myself in the learning process.	3.96	0.996
7)	I believe that I am responsible for my own learning.	4.04	1.071
8)	I keep my desire to learn high until I realize my learning.	3.96	1.089

Table 9 shows the results regarding the determination of Learner control by the University students. Although there is a significant difference in most of the statements, one of the most prominent statements of university students 'I decide myself in which order I will work on the learning materials on the Internet. $M = 3.90$ average has been reached. In addition, one of the most prominent expressions of University Students 'I decide myself when to study the learning materials on the Internet. It is seen that the average of $M = 3.89$. With these findings, it can be said that the results of University Students' Learner Control are high.

Results of descriptive statistics of university students on learner control

Table 9. Descriptive statistics results on the learning control of university students

No.	Substances	M	SD
<i>Learner control</i>			
1)	I direct my learning process myself while I am learning a subject on the internet.	3.84	1.130
2)	I decide how much I will concentrate on which of the learning materials on the Internet.	3.85	1.170
3)	I decide myself when to study the learning materials on the Internet.	3.89	1.073
4)	I decide myself in what order I will study the learning materials on the Internet.	3.90	1.097

Descriptive statistics results of university students' motivation for STEM and distance education

Table 10 shows the results of determining the motivation of university students towards STEM and distance education. Although there is a significant difference in most of the statements, one of the most prominent expressions of university students is 'I like to share my thoughts with others while I am teaching on the internet.' $M = 3.40$ average has been reached. In addition, one of the most prominent expressions of University Students is 'I am eager to learn the lessons on the Internet.' It is seen that there is an average of $M = 3.36$. With these findings, it can be said that the motivation of university students towards STEM and distance education has high results. Finally, it is seen that the overall average of University Students' STEM and Distance Education Readiness Status is $M = 3.79$. With these findings, it can be said that the results of determining the readiness of University Students on STEM and Distance Education are high.

Comparison of STEM and distance education readiness of university students

Table 10. Descriptive statistics results regarding the motivation of university students towards STEM and distance education

No	Substances	M	SD
<i>Motivation for STEM and distance education</i>			
1)	I am eager to learn lessons online.	3.36	1.362
2)	I am interested in learning the lessons on the internet.	3.28	1.378
3)	Learning lessons online is an effective way to learn.	3.33	1.372
4)	I think it will be enjoyable to learn the lessons on the internet.	3.26	1.408
5)	I am confident in learning the lessons on the internet.	3.29	1.339
6)	I like to share my thoughts with others while teaching the lessons on the internet.	3.40	1.279
Grand total		3.79	0.812

In Table 11, Kruskal Wallis H-Test results are presented in order to determine the comparison of STEM and Distance Education Readiness Status of University Students.

As can be seen in Table 11, the results of the comparison status of University Students between STEM and distance education readiness university departments are given and a significant difference was found between university students. ($\chi^2 = 4.23$; $p = 0.000$; $p < 0.05$). According to the findings, it can be said that the readiness of ‘STEM Education’ ($M:3.91$) is higher than the distance education readiness status. Again, according to the findings of the research, it can be said that the department with the highest average score ($M = 4.38$) compared to the other departments is ‘Distance Education’.

Table 11. STEM and distance education readiness of university students

	Department	N	Average rank	SD	χ^2	p
STEM and remote readiness situations	STEM	320	3.91	0.510	4.19	0.000
	Distance Learning	200	4.38	0.481		
	Total	520	3.79	0.812		

4 Discussion

In the study ‘Investigation of the Perceptions of Distance Education Students' Self-Efficacy towards Online Technologies’ by Yildiz and Seferoglu [23], developments in educational technology and learning theories have increased the way and diversity of learning with the introduction of computers in education and reached the conclusion that students need to use more computers during the day. Based on these comments, it can be said that students need technology support for their education and daily life, and that their needs provide education and convenience for their own lives. Poyraz and Kumtepe [17] conducted their study titled ‘An Example of STEM Education in Turkey and Distance Education for Sustainable STEM Education’, in which STEM education, the knowledge and skills acquired by students from an interdisciplinary perspective, is

the synthesis and evaluation of Bloom's taxonomy. As a result, this study, which was carried out with the findings of distance STEM education design and applications, as well as the opinions of almost all relevant stakeholders of the subject, included an example of STEM education applied in our country and multidimensional evaluations of the remote implementation of this education. Conducting validity and reliability studies for different sample groups in future studies of the STEM Attitude Scale in the study titled 'STEM Attitude Scale Development Study for Teachers' conducted by Inam [11] and large-scale studies where teachers' attitudes towards STEM can be examined in terms of various variables. It has reached the conclusion that it is recommended to be used for.

Güneş [9], aiming to reveal students' perceptions of ADL and BL, included two first-year students, the first group was taught English through ADL, and the second group was taught face-to-face education and ADL in this study. English was taught through BL, expressing the combination of the process. To collect data, seven students from the ADL group and six students from the BL group were identified and semi-structured interviews were conducted with 13 students one by one. As a result, it was found that the students in the ADL group were not satisfied with being taught remotely. On the other hand, the BL process was preferred by all BL students included in the interviews. Sutiah et al. [20] conducted research with distance education and found that students find it difficult to achieve learning outcomes while at the same time worrying about achieving learning outcomes during the COVID-19 pandemic, and that distance learning gained a valuable alternative when classroom learning was delayed during the COVID-19 pandemic. It is also important to acknowledge that face-to-face learning cannot be a substitute, but can support existing general classroom-based learning models. Based on these results, it can be said that the type and age group of distance education differs according to regions. Based on these results, it is thought that STEM and Distance education studies will contribute to the field by writing more studies in the literature.

5 Conclusion

The development of the internet and technology has increased in frequency as it appeals to every field today, now it is seen that while we carry the technology in our pocket, internet support comes to every field, according to the results of the research, it is seen that the university students have internet usage information during the day, students who use internet for 9 hours and 44.6% (232 people) were concluded. It can be said that students need technology support for their education and daily life, and their needs provide education and convenience for their own lives. Again, according to the results of the research, it was found that the highest value of computer uses knowledge of the students participating in the study was 44.2% (190 people) of the students who used computers for 7 hours or more. As self-efficacy provides benefits in every field, it is important in the field of technology, the results of determining STEM self-efficacy of university students were examined in the study, although a significant difference was seen in most of the statements, it was concluded that university students were able to

access stem files, one of the most prominent expressions, and working with the stem made them happy. The internet knowledge mentioned in the research is of great importance due to its field, the internet has become an element in almost every home, so when looking at the other result of the research, there are results regarding the determination of the Internet self-efficacy of the university students. Although there is a significant difference in most of the statements, it has been concluded that university students can easily use search engines. With these findings, it can be said that the results of determining the Internet self-efficacy of University Students are high. When looking at another result of the research, there are results regarding the determination of the distance education self-efficacy of the university students. Although there is a significant difference in most of the statements, it has been concluded that one of the most prominent expressions of the university students, 'They can easily use distance education applications (Skype, Google hangout, Google Meet, Adobe Connect, Zoom, Microsoft Teams etc.) on the internet environment.

Finally, according to the results of the research, according to the results of the comparison of STEM and distance education readiness of university students, the results of the comparison between STEM and distance education readiness university departments were included and a significant difference was found between university students. It can be said that the readiness status is higher than the Distance Education readiness. Again, according to the findings of the research, it was concluded that the department with the highest average score of 1 compared to the other departments is 'Distance Education'. According to this result, findings regarding distance STEM education design and applications have been reached. This study, conducted with participants from different fields (distance education, STEM education, science, etc.), has come to the conclusion of an example of STEM education applied in our country. It is suggested that more studies should be included.

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7 Authors

Natalia A. Zaitseva is a Doctor of Economics, Professor of the Department of Hospitality, Tourism and Sports Industry at Plekhanov Russian University of Economics (36 Stremyannyi Pereulok, 115093, Moscow, Russia). Her main scientific and professional interests are connected with professional standards and assessment of personnel qualifications in the tourism and hospitality industry, she actively studies strategic management of tourism development in the regions, the strategy for building human capital at the macro and micro levels, effective management and self-management. She is a member of 3 dissertation councils of some Russian universities for the defense of doctoral and PhD theses.

Zhanna M. Sizova is a Doctor of Medicine, Professor, Head of the Department of Urgent and Outpatient Therapy at I.M. Sechenov First Moscow State Medical University (Sechenov University) (8 Trubetskaya Street, 119991, Moscow, Russia). She has more than 120 published articles in Russian and International journals. Her research interests are connected with health care education (email: sizova-klinfarma@mail.ru).

Vera A. Chauxova is Senior Lecturer of the Department of Foreign Languages at Peoples' Friendship University of Russia (RUDN University) (6, Miklukho-Maklyaya street, 117198, Moscow, Russia). Her main scientific and professional interests are con-

nected with language education. She actively studies the problems of educational technologies, and educational environment possibilities. She has more than 30 published articles in Russian and International journals (email: Chauzova_va@rudn.ru).

Anna A. Larionova is a PhD in Economics, Associate Professor of the Department of Corporate Finance and Corporate Governance, Financial University under the Government of the Russian Federation, Moscow, Russia (49 Leningradsky Prospekt, 125993, Moscow, Russia). Her main research and professional interests are related to corporate finance, cash flow modeling, financial management in the field of tourism and hospitality, she actively studies strategic management of tourism development in the regions, taxation issues, and prospects for higher education (email: annla@list.ru).

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