УДК 371.314.5 **DOI: 10.18413/2313-8971-2021-7-2-0-2**

V.N. Kormakova*
Al.G. Klepikova,
E.N. Musaelian

New approaches to managing the Internet-Based Student Engagement Technology

Belgorod State National Research University,
14 Studencheskaya Str., Belgorod, 308007, Russia
kormakova@bsu.edu.ru*

Received on March 31, 2021; accepted on June 10, 2021;
published on June 30, 2021

Abstract. The article presents *the findings* of a study on managing the Internet-Based Student Engagement Technology. It shows that this process is successfully carried out through the competence approach, which corresponds to one of the priority directions of informatization of secondary general education. The management of the learning engagement process is based on the call to action, the organization of the action itself, and the feedback. Organizing feedback in engaging learning is based on formative assessment, which helps the teacher to get information about how well their students are learning. The most important component of the educational process and the experience of the teacher is the competent use of technology to involve the students in Internet service-based learning. Visual storytelling and gamification with the main approaches contribute to this process of involvement in learning: quick response (allows to organize feedback in no time), status marathon (helps to increase learning motivation), simulated discovery (allows to organize the learning process effectively), surprise (interesting presentation of educational material), wow-effect (a learning tool that helps to cause an emotional response). Guided by these approaches to the effective use of technology to engage students in the learning process with the help of Internet services, we used a diagnostic technique for learning motivation and emotional attitude to the process of learning, the results of which are justified in the findings. The study results determined positive dynamics and confirmed the hypothesis that techniques for involving students in the educational process, which is based on the use of Internet network resources considerably increases the educational and cognitive motivation and successful emotional attitude of learners towards the learning process.

Keywords: information technology in education; information technologies in school students' training; Internet services in training; gamification; storytelling; techniques for involving in the learning process.

Information for citation: V.N. Kormakova, Al.G. Klepikova, E.N. Musaelian (2021), “New approaches to managing the Internet-Based Student Engagement Technology”, Research Result. Pedagogy and Psychology of Education, 7 (2), 18-28, DOI: 10.18413/2313-8971-2021-7-2-0-2.

Кормакова В.Н.*
Клепикова А.Г.,
Мусаелян Е.Н.

Новые подходы в управлении технологией вовлечения школьников в обучение на основе Интернет-сервисов

Белгородский государственный национальный
исследовательский университет
ул. Студенческая, 14, г. Белгород, 308007, Россия
kormakova@bsu.edu.ru*

Статья поступила 31 марта 2021; принята 10 июня 2021;
опубликована 30 июня 2021

Аннотация. В статье представлены *результаты* исследования по управлению технологией вовлечения школьников в обучение на основе Интернет-сервисов. Показано, что данный процесс успешно осуществляется в соответствии с требованиями компетентностного подхода, что соответствует одному из приоритетных направлений информатизации среднего общего образования. Управление процессом вовлечения в обучение базируется на призыве к действию, организации непосредственно самого действия и обратной связи. Организация обратной связи в вовлекающем обучении основывается на формирующем оценивании, которое помогает учителю получить информацию о том, насколько успешно обучаются его ученики. Отсюда важнейшей составляющей учебного процесса и профессионализма учителя является грамотное использование технологии вовлечения школьников в обучение на основе Интернет-сервисов. Этому процессу вовлечения в обучение способствуют визуальный сторителлинг и геймификация с ее основными подходами: быстрый отклик (позволяет быстро организовать обратную связь), статусный марафон (способствует повышению учебной мотивации), моделируемое открытие (позволяет эффективно организовать учебный процесс), сюрприз (интересная подача учебного материала), вау-эффект (инструмент обучения, помогающий вызвать эмоциональный отклик). Руководствуясь данными подходами эффективного применения технологии вовлечения школьников в учебный процесс с помощью Интернет-сервисов, нами была использована методика диагностики мотивации учения и эмоционального отношения к процессу учения, результаты которой обоснованы в полученных выводах. Полученные результаты применения технологий вовлечения обучающихся в учебный процесс на основе использования сетевых ресурсов Интернета подтвердили гипотезу о том, что в этих случаях значительно повышается учебно-познавательная мотивация, положительное эмоциональное отношение к процессу учения.

Ключевые слова: информатизация образования; информационные технологии в обучении школьников; Интернет-сервисы в обучении; геймификация; сторителлинг; технологии вовлечения в учебный процесс.

Информация для цитирования: Кормакова В.Н., Клепикова А.Г., Мусаелян Е.Н. Новые подходы в управлении технологией вовлечения школьников в обучение на основе Интернет-сервисов // Научный результат. Педагогика и психология образования. 2021. Т.7. №2. С. 18-28. DOI: 10.18413/2313-8971-2021-7-2-0-2.

Introduction. Modernization of educational process through new digital technologies can lead to significant improvement of traditional educational results, formation of qualitatively new ones, and development of cognitive potential of each learner. With the development of information and communication technologies that are based on the use of network resources of the Internet, teachers have a real opportunity to "manage the educational process, by providing the student with the necessary educational tools, information and communication, stimulating their high personal involvement and self-learning activities" (Shutenko, 2015). The specificity of these tools is that they are not just delivered by teachers or are open to students, but are in the interactive activity, in the process of which teachers and students create and critically explore new knowledge. At the same time, the students are active participants in the learning process, get the necessary knowledge, analyze, compare, and are in a constant heuristic search (Chee, Divaharan, Tan and Mun, 2011; Borodkina, 2015).

Nevertheless, modern students are very pragmatic about cognitive development. Sometimes it is not easy for a teacher to keep the learners attention, to motivate them to work, if they do not feel that the acquired knowledge can be applied "on the spot". The teacher needs to understand that in the conditions of lack of educational motivation and tolerance they should work in a different way. These processes need to be managed. In this regard, the teacher is to look for new approaches that are aimed to increase the level of sustainable cognitive motivation, to involve the students in the educational process, to enable the individual needs of students (d'Aquin, 2016).

Main Part. According to the studies (eLearning and the Science of Instruction, 2014), involvement in learning process is characterized by two main parameters – behavioral and mental activities. It is important that the student shows a high level of such activity during the training session. The activity, not supported by reasoning, has a low impact on the course of teaching. Therefore, to create an exciting training session, first of all, it is necessary to pay attention to the organization of mental activity: to pick up some active teaching methods so that students can get the required knowledge and skills.

To test the hypotheses about the effective use of technology involvement in the educational process, we developed the criteria to study the levels of students' engagement in the learning process: the criteria of motivation achievement, the criteria of cognitive activity, and of emotional reflection. The first two levels were measured on the basis of methods of diagnostics of motivation of learning and emotional attitude to learning (modification of A.D. Andreev) (The method of diagnostics of learning motivation and emotional attitude to learning, 1987). At the emotional reflection, the mood and emotional perception of the learning material were assessed.

According to practicing teachers (Pavlova, 2018), psychological and pedagogical conditions of management of application of technologies of involvement are the following: plan training sessions based on pedagogical design; selection of assignments of optimal complexity; organization of operational feedback; initiation of training situations with the possibility of practical application of the acquired knowledge and skills.

The management of the learning engagement process is based on the call to action, the organization of the action itself and feedback. The peculiarity of feedback in engaging learning is based on formative assessment: the class that "forms assessment helps each teacher to get information about how much and how well their students are learning" (Pinskaya, 2016). This information is necessary for the teacher to find the most effective teaching methods and motivate the students to become more active in educational and cognitive activities. For the student it is an opportunity to evaluate themselves and others following the developed criteria, to understand how and what is evaluated in their educational activity, to get carried away with the process of teaching, where they "learn to learn". As a result, the

level of educational and cognitive motivation increases, the learners show interest, enjoy the process of manifestation of their own activity.

The use of technologies that ensure the involvement of each student in the active cognitive process, makes the teacher to determine which of the studied material should be learned by the student and understand what forms of assessment correspond to this. This process of involvement in learning process is facilitated by gamification with its basic approaches. Gamification in the classroom allows to make the studied material more exciting and memorable, relieves tension, promotes emotional discharge, allows to a certain extent to bring thinking from the rational sphere to the sphere of fantasy (Klepikova, 2018). In order for gamification to benefit in the learning process, it is necessary to focus on the component that stimulates thinking activity. Gamification can be successfully used for mastering the concepts of a topic or section in an academic subject, as well as an alternative lesson or part of it (introduction, explanation, consolidation, exercise, control) (Karaolis, 2019).

The first approach in gamification is quick response. It allows you to quickly organize feedback. These can be test assignments, but always with feedback or comments that allow you to analyze and understand what mistakes were made in the answers. In this activity the teacher will be helped by the LearningApps.org service, which is a practical resource consisting of visual content – a visual representation of theoretical work and assignments for students. The LearningApps tools allow to create interactive assignments of different types: quizzes, sorting, grouping, classification, text input (d'Aquin, 2016; Karaolis, 2019), crosswords (fig. 1).

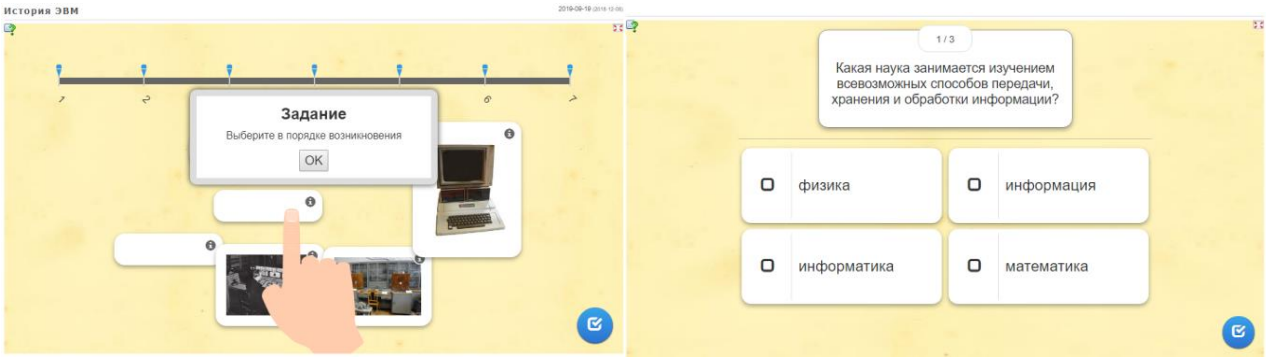

Fig. 1 Assignments in the LearningApps for IT school students
Рис. 1 Задания в LearningApps для школьников, изучающих информатику

Using the Wizer.me service worksheets in "rapid response" allows you to manage the growth and development of students, to get the most complete picture of their individual needs. You can provide access to the worksheet in several ways: through a link; through the Google Classroom; through the embedded code "embed" on the teacher's website. Students follow the link, log in to their account and start working on their assignments (fig. 2). When the assignments are completed, the students send their answers. In online mode, the teacher does not see the work of students on assignments, but if you enable the "automatic feedback to students" option, then students will immediately receive feedback on the results of the work.

The Puzzlecup.com service or the Crossword Factory enables the students to engage in the fascinating process of crosswords puzzles in the classroom, both online and prepared on paper, thereby consolidating the knowledge of terms and definitions on a particular topic, presented by the teacher in a visual form (fig. 3). The quick response of the teacher to the students answers makes it possible to once again draw attention to any mistakes made by the students and analyze their answers.

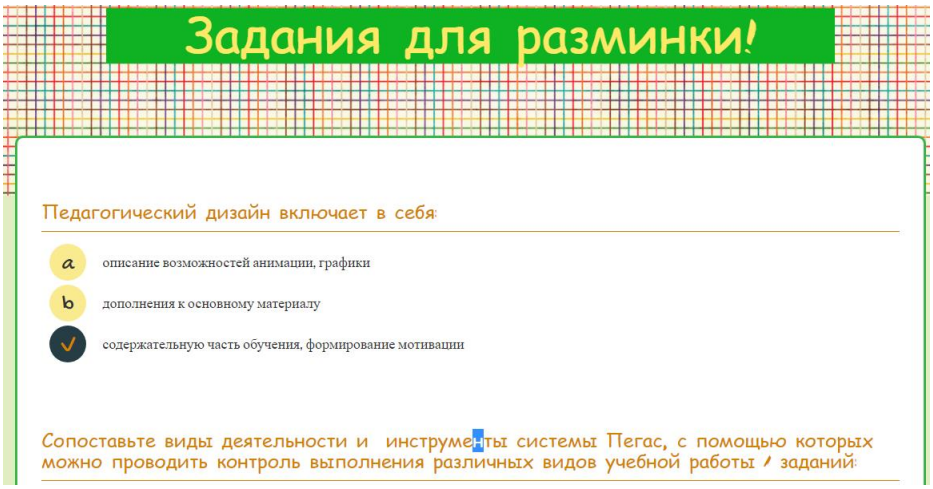

Fig. 2 The Wizer.me service in educational process
Рис. 2 Использование сервиса Wizer.me в учебном процессе

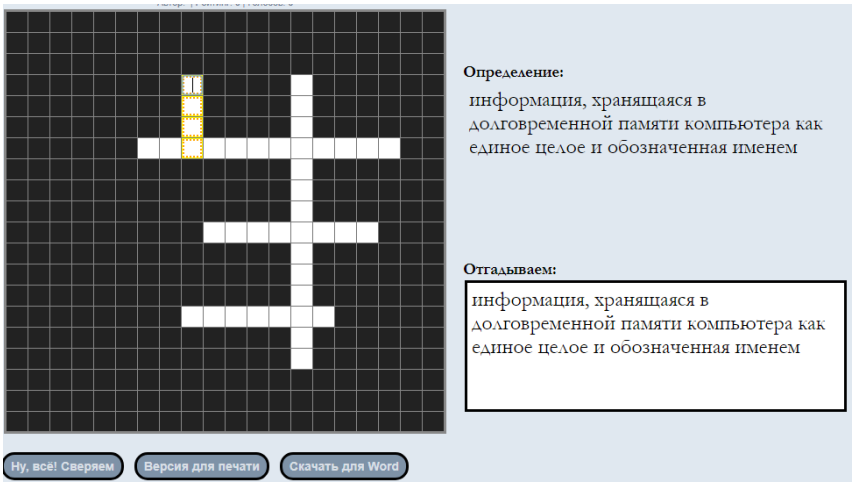

Fig. 3 Crossword Factory in puzzlecup.com
Рис. 3 Кроссворд на основе сервиса puzzlecup.com

Moreover, in the “quick response” approach, you can lay a competitive format for students in order to organize the competition of students with each other, for example: who will answer questions or assignments faster. The competitive format is caused, first of all, by a special competitive atmosphere of the educational process. Students at the same time independently try to find answers to the questions posed, at the same time challenge themselves and others, by trying to become leaders, and thus earn bonuses or points in their piggy banks of knowledge. In this case, the Kahoot service helps the teacher to involve, analyze, expand the content of training, make the learning process more interesting. The students connect to this service from their tablets or smartphones, and complete the assignments (fig. 4).

The answers are displayed on the screen and the students see who was the first to cope with the task (fig. 5).

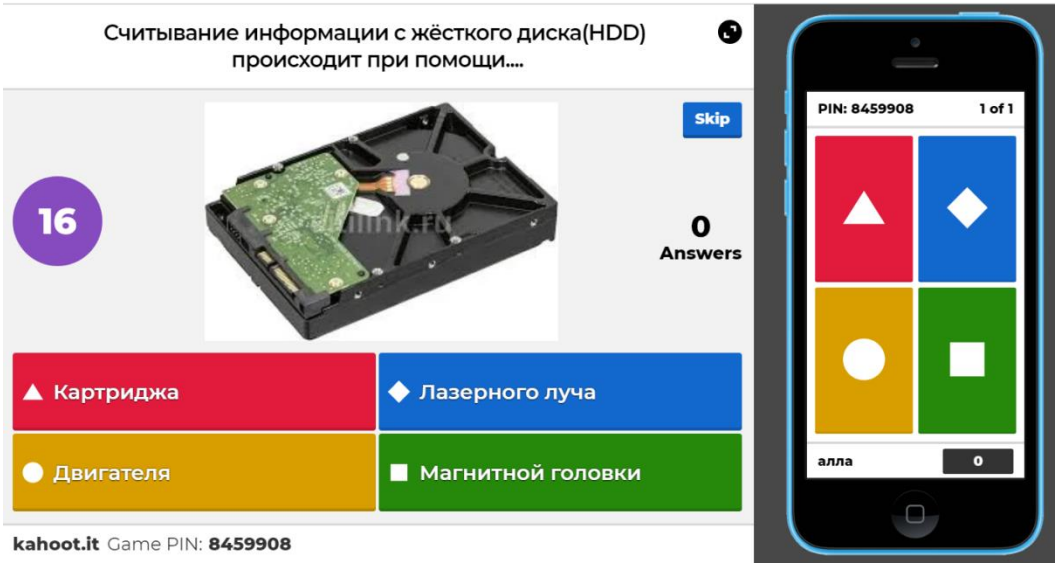

Fig. 4 The Kahoot service in recitation in IT class
Рис. 4 Сервис Kahoot в опросе учеников по дисциплине «Информатика»

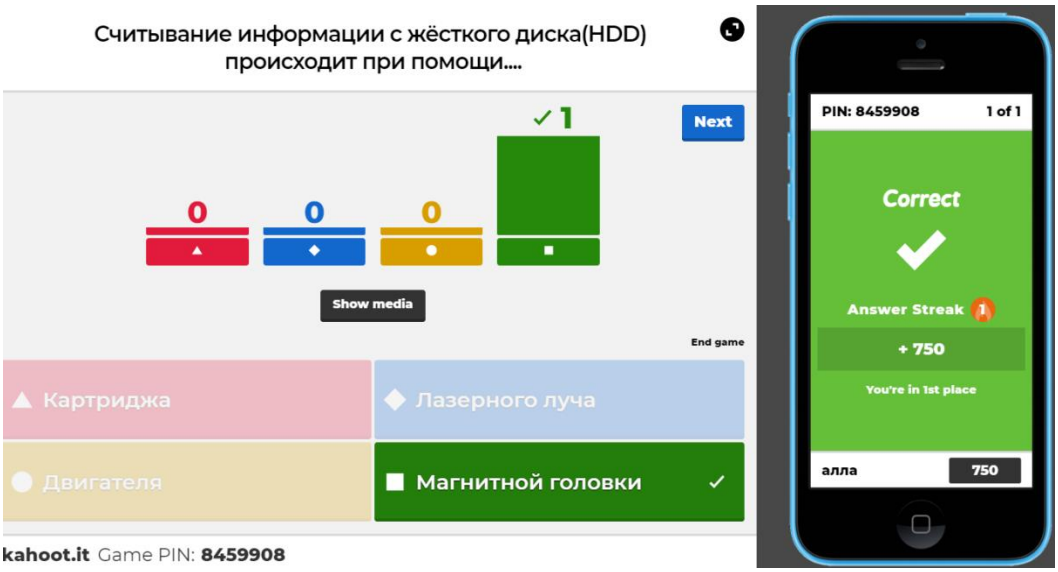

Fig. 5 The answers on the screen
Рис. 5 Вывод результатов опроса на экран

The second approach – the status marathon is associated with the acquisition of some status (a badge) by students for a successfully completed stage of the marathon. When performing the game assignments, the students may require different types of motivation. External motivation – rewards, bonuses that students receive for certain actions. Internal motivation arises under the influence of their own aspirations, desires, needs: their own arousal activities, creativity, communication, power, knowledge, the need for something else, self-determination, etc. In this approach, external motivation is the object of gamification. The student can take the action to satisfy vanity, and obtain the approval of others. The motive of the student's behavior in this case is the status.

The student can be motivated by additional rights, power (opportunities that other students do not have), material values (prizes). More often this approach is used in distance learning. However, it can be successfully used

in traditional forms of education, when the assignments are used as a "status marathon" in terms of an intellectual game "Your Quiz". Assignments are created using the Learning service (https://www.learnis.ru) based on the popular TV game "Jeorpady", which allows you to earn bonuses for correct answers (fig. 6).

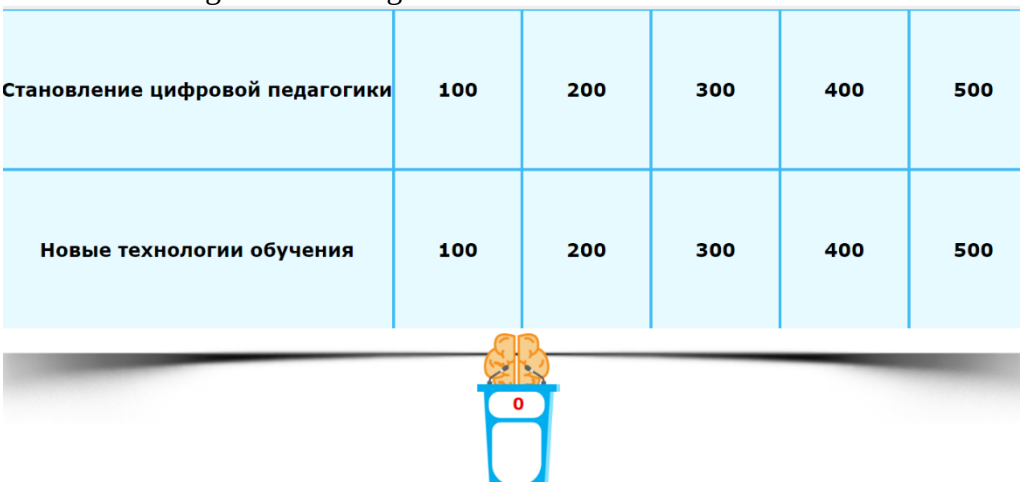

Fig. 6 Quiz on the Learnis service
Рис. 6 Вид викторины на основе сервиса Learnis

The next approach is a *simulated discovery*. This approach is often used in developmental teaching, when the student is not given information, they get it on his own. As a result, some discovery is made or some hypothesis is approved. The concern of the teacher is to organize an independent educational and cognitive process.

The technology of Web-quests is proper to "simulated discovery". On its basis, one can create assignments that increase the students' interest in the study of a particular discipline; imagine a variety of situational assignments, etc. Learnis – the service for creating web quests (https://www.learnis.ru) allows to create genre quests such as "leave the room" (fig. 7). In such web quests, participants are assigned with getting out of the room with various items, finding clues and solving logic problems. Each quest room has unique game mechanics and allows you to embed a different number of assignments. Hints can be answers to the assignments that need to be solved to move forward the story of the quest (Karaolis, 2019). The teacher adds various story assignments to the web quest, thus making the quest educational and fascinating at the same time (Boytsova, 2014; Herold, 2017).

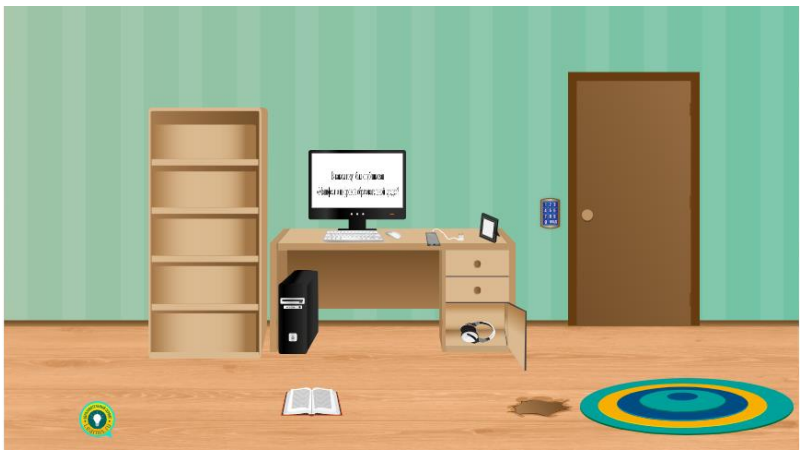

Fig. 7 Web quest "Leave the room"
Рис. 7 Пример Веб-квеста «Выберись из комнаты»

The "model discovery" approach blends harmoniously with the strategy the "flipped classroom". The concept of flipped learning is based on the ideas of active learning, blended learning, involvement of students in activities. The "flipped classroom" expands the possibilities of individualization of learning, which takes into account the educational needs, interests and abilities of students, and the teacher serves as a mentor. When working in the "flipped classroom" mode, the share of responsibility of the student increases, the development of their personal qualities (activity, responsibility, initiative) and meta-subject skills (self-organization, management of temporary resources) is stimulated. The key components of the technology of the flipped classroom are: 1) information and educational environment for communication of students with educational content; 2) interactive instructions and simulators for working with educational content; 3) providing monitoring systems for teachers; 4) teachers and students feedback (Loginova, 2015) for the purpose of operational correction of educational results. Application of the "flipped classroom" technology:

− encourages students to prepare for each lesson, as the assignments can be completely different: from online tests to assignments for reflection. Meanwhile in each case they contain a certain incentive to come to the class prepared;

− provides activity in the classroom, which aims to increase the level of cognitive activity. If learners have acquired basic knowledge outside the classroom, they should spend the lesson time learning more deeply and improving their skills, using new knowledge, getting involved in the learning process.

In any taught course one can find a place for this approach, as the teacher can easily design assignments for simulated discovery.

Another approach is *a surprise*. With this approach, the main thing to present a lecture interesting, to do something unpredictable, to present it as a surprise. It is important that the delivery ("shell") and the content ("filling") can be different in order for the revision to be successful.

The next approach is a *wow-effect* – a surprise effect. It is associated with the emotional effect of the students, for whom the surprise effect can play a good role in the study of educational material (for example, an unexpected scenario of classes, a virtual tour, an interesting memorable story, etc.). In this case the tools of visual storytelling (Digital Storytelling) can be helpful – one of the powerful tools of learning, which allows not only to convey information (Kormakova, 2019), but also to cause an emotional response.

Zh.V. Ermolaeva and O.V. Lapukhova emphasize two main types of pedagogical storytelling: classical and active (Ermolaeva and Lapukhova, 2016). In classical storytelling, the teacher transmits specific educational information to the students: rules, theoretic work, explanation of the new, experiment, laws, and so on, presented in a bright form of a memorable story. In this case, students listen and perceive this information. In active storytelling the students are involved in the process of creating and telling stories, they can create their own stories, following the instructions of the teacher; they can model different situations and look for solutions; they analyze stories independently or with a teacher (fig. 8, 9).

We tested the hypothesis about the effective application of involvement technologies in the educational process among schoolchildren of 5-7 grades in educational institutions in Belgorod. The following methods were used to study the assignments: pedagogical observation, discussion of the classes, questionnaires, talks with students. A total of 84 students participated in the study: 24 students in 5th grade, 32 in 6th grade and 28 in 7th grade.

In accordance with the methodology for diagnosing the learning motivation and emotional attitude to learning (modification of A. D. Andreev) for obtaining calculated points on the questionnaire scale, the total score is calculated by the formula:

CA + MA + (- A) + (- A), where

CA-score on the scale of cognitive activity; MD-score on the scale of motivation achievement; T-score on the scale of anxiety; G-score on the scale of anger.

Fig. 8. The story, made up with the Biteable service
Рис. 8. История, созданная с помощью сервиса Biteable

Fig. 9. The story made up with the VideoScribe service
Рис. 9. История, созданная с помощью сервиса VideoScribe

To get points on the scale, the sum of the weights on all 10 points of this scale is calculated. The minimum score on each scale is 10 points, the maximum is 40 points.

With the applied methodology, we have identified the following levels of learning motivation: I level-productive motivation with a pronounced predominance of cognitive motivation of learning and a positive emotional attitude to it (28-40 points); II level – the average level with a slightly reduced cognitive motivation (21-27 points); III level – reduced motivation, the experience of "school boredom", negative emotional attitude to learning (10-20 points) (Method of diagnostics of learning motivation and emotional attitude to learning).

To determine the level of emotional reflection at the end of the lesson each student evaluated their contribution to the achievement of the lesson objectives (table Bono) (Edward de Bono, 1985), their activity, the efficiency of the class, the fascination and usefulness of the chosen forms of work ("a Tree of creativity" method: the children attach leaves, flowers, and fruits to the tree. A fruit means that the lesson was useful and productive; a flower – pretty good; a leaf – not quite satisfied with the lesson).

According to the results of diagnostics, there are noticeable changes in the classes compared to the initial stage of the study: the students did not want to leave the lesson, they were interested in whether there would be more classes of this kind, productive motivation with a predominance of cognitive motivation of the learning and a positive emotional attitude to it has changed for the better (Table).

Table

Diagnostics findings of motivation of teaching and emotional attitude to teaching

Таблица

Результаты диагностики мотивации учения и эмоционального отношения к учению

Criteria	Level III		Level II		Level I	
	Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)
Motivation achievement	21	6	13	15	66	79
Educational activity	14	8	37	22	49	70
Emotional reflection	9	4	34	12	57	84

Positive emotions that are generated by new approaches to learning, which are based on the use of Internet resources, make the learning experience of the learner and affect their ability in achieving success (fig. 10).

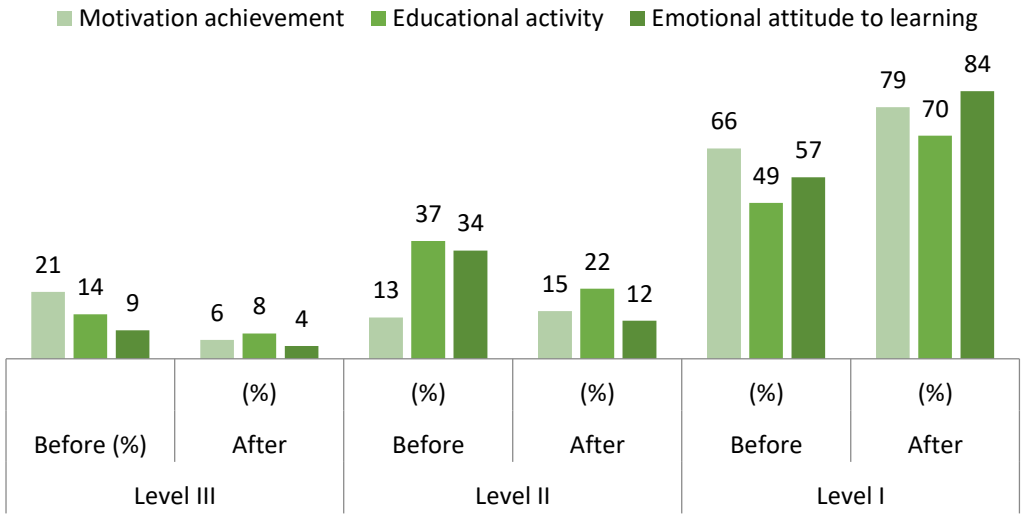

Fig. 10 Motivation diagnostics of learning and emotional attitude to learning
Рис. 10 Диагностика мотивации учения и эмоционального отношения к учению

Conclusions. The findings obtained in the study allowed to note the achieved goals of the study to increase the level of learning motivation and emotional attitude of students to the educational process. According to the authors of this study, the management of the technology of involving the in the Internet network resources learning process can be effective if visual storytelling and gamification with the main approaches are used: quick response, status marathon, simulated discovery, surprise, wow effect. The use of the Internet-Based Student Engagement Technology helped to increase the learning motivation and emotional attitude of students to the learning process. The conclusions can be justified.

The authors thank Head of Belgorod State National Research University for the opportunity to perform the experiment.

References

Alla G. Klepikova, Valentina N. Kormakova, Elena N. Musaelian, Yulia A. Prokopenko, (2018), "Quality Management Principles of Scientific and Methodological Support for Students' Activity within E-Learning Environment", *Proceedings of the Multidisciplinary Symposium on Computer Science and ICT Stavropol, Russia, October 15, 2018*, Stavropol, 63-75. https: // www. elibrary.ru /item.asp?id=36537515 (Accessed 30 March 2021).

Boytsova, E.G. (2014), "Formative assessment of students' educational results in a modern school", *Man and education*, 1(38), 171-175.

Borodkina, N.V. and Tikhonova, O.V. (2015), *Formiruyushcheye otsenivaniye v shkole* [Formative assessment in school], Textbook, Yaroslavl, Russia.

Bono, Edward (1985), "Six Thinking Hats: An Essential Approach to Business Management", Little, Brown, & Company, available at: https://4brain.ru/books/6-shyap.php?ici_source=ba&ici_medium=link (Accessed 13 February 2021).

Chee, T.S., Divaharan, S., Tan, L. and Mun, C.H. (2011), *Self-directed learning with ICT: Theory, practice and assessment*, Ministry of Education, Singpore, Singpore.

d'Aquin, M. (2016), *On the use of linked open data in education: Current and future practices*, Springer International Publishing, Bern, Switzerland.

Ermolaeva, Zh.E. and Lapukhova, O.V. (2016), "Storytelling as a pedagogical technique of designing educational assignments in the University", *Scientific and methodological electronic journal "Concept"*, 6, 128-137. https: //www.elibrary.ru/item.asp?id=26212070 (Accessed 09 March 2021).

Herold, B. (2017), "Personalized Learning: Modest Gains, Big Challenges, RAND Study Finds", available at: https:// deansforimpact.org/news/edweek-personalized-learning-modest-gains-big-challenges-rand-study-find (Accessed 24 February 2021).

Karaolis, S. (2019), "4 awesome examples of gamification in elearning", available at: URL: https://www.elucidat.com/blog/gamification-in-elearning-examples / (Accessed 15 February 2021).

Karaolis, Stephanie (2019), "How to win at gamification in elearning, every time!", available at: URL: https://www.elucidat.com/blog/elearning-gamification/(Accessed 16 February 2021).

Kormakova, V., Klepikova, A., Musaelian, E., Baybikowa, G. and Lapina, M. (2019), "Formation of ICT – Competencies of postgraduate students of teacher education based on interactive techniques", CEUR Workshop Proceedings, *Proceedings of the International Scientific Conference Innovative Approaches to the Application of Digital Technologies in Education and Research (SLET-2019) Stavropol-Dombay, Russia, May 20-23, 2019*, Stavropol. https://www.elibrary.ru / item.asp?id=41822741 (Accessed 23 March 2021).

Loginova, A.V. (2015), "Peculiarities of use and principles of functioning of pedagogical model "flipped classroom", *Young scientist*. 9, 1114-1119.

Method of diagnostics of learning motivation and emotional attitude tolearning (modification of A.D. Andreev), available at: http://tropinkaksebe7.blogspot.com/p/blog-page_10.html (Accessed 19 March 2021).

Pavlova, S.A. (2015), "Involvement in training", available at: https://www.youtube.com /watch?v=O7fi481nX-g (Accessed 02 February 2021).

Pinskaya, M.A. (2010), *Formiruyushcheye otsenivaniye: otsenka dlya obucheniya* [Formative assessment: assessment for learning], available at: https://docplayer.ru/5230-Formiruyushchee-ocenivanie-ocenivanie-dlya-obucheniya.html. (Accessed 28 March 2021).

Ruth C. Clark, Richard E. Mayer. eLearning and the Science of Instruction (2014), "What is e-Learning", (translated by Denis Yakorev) available at: http://e-lpro.blogspot.com/search/label/ eLearning%20and%20the%20Science%20of%20Instruction (Accessed 26 February 2021).

Shutenko, A.I. (2015), "Functional model of application of modern information techniques for the purpose of students' self- realization in higher education", *Nauka*. *Idea*, 8, available at: URL: https://www.elibrary.ru/item.asp?id=25423800 (Accessed 30 March 2021).

Информация о конфликте интересов: авторы не имеют конфликта интересов для декларации.
Conflicts of Interest: the authors have no conflict of interests to declare.

About the authors:
Valentina N. Kormakova, Doctor of Pedagogic Sciences, Assistant Professor, Professor of the Department of Pedagogy, Belgorod State National Research University.
Alla G. Klepikova, Candidate of Pedagogic Sciences, Assistant Professor, Associate Professor of the Department of Computer Science, Natural Sciences and Teaching Methods, Belgorod State National Research University.
Elena N. Musaelian, Candidate of Pedagogic Sciences, Assistant Professor, Associate Professor of the Department of Foreign Languages, Belgorod State National Research University.

Данные авторов:
Кормакова Валентина Николаевна, доктор педагогических наук, профессор кафедры педагогики, Белгородский национальный исследовательский университет.
Клепикова Алла Григорьевна, кандидат педагогических наук, доцент кафедры информатики, естественнонаучного образования и методик преподавания факультета математики и естественнонаучного образования, Белгородский национальный исследовательский университет.
Мусаелян Елена Николаевна, кандидат педагогических наук, доцент кафедры иностранных языков факультета иностранных языков, Белгородский национальный исследовательский университет.