

Organizing high school students' independent learning using information and communication technologies

Dostovalova, Elena V. (a), Prokopenko, Anna Y. (b), Strogova, Natalja A. (c), Maschanov, Alexander A. (d), Borovik, Yulia N. (e), Alpatova, Natalia S. (f)

a) PhD (Education), Associate Professor, Siberian Federal University (SibFU), 79 Svobodny pr., 660041, Krasnoyarsk, Russia, E-mail: dostovalova@list.ru

b) PhD (Education), Dean, Correctional Education and Special Psychology Department, Moscow Social Pedagogical Institute, 75 Friedrich Engels ul., building 3, 105082, Moscow, Russia, E-mail: annaprokopenko@mail.ru

c) PhD (Education), Associate Professor, Moscow Social Pedagogical Institute, 75 Friedrich Engels st., building 3, 105082, Moscow, Russia, E-mail: natalyastrogova@rambler.ru

d) PhD (Medical Sciences), Associate Professor, Siberian Federal University (SibFU), 79 Svobodny pr., 660041 Krasnoyarsk, Russia, E-mail: aa-mashanov@yandex.ru

e) Deputy Dean, Correctional Education and Special Psychology dept., Moscow Social Pedagogical Institute, 75 Friedrich Engels st., building 3, 105082, Moscow, Russia, E-mail: lait0707@mail.ru

f) PhD (Sociology), Associate Professor, Volgograd State Social Pedagogical University, 27 Lenina pr., 400066, Volgograd, E-mail: alpatova.ns@mail.ru

Abstract

The ultimate goal of educational activity is the formation of a student as a full-fledged subject of the educational process. A prerequisite for this is achieving by students of such level of development, when they are able to independently determine the purpose and objectives of their training activities, update the necessary knowledge, plan their actions, adjust them in accordance with the goal without the help of the teacher.

Today it becomes obvious that one of the basic requirements of the society for the school of the 21st century is the formation of a personality that is capable of solving social, industrial and scientific problems, as well as being able to think critically, develop and defend one's position, one's convictions, and at the same time this person must systematically and constantly replenish and update their knowledge through self-education, improve their skills and use them creatively in their practical work.

The authors of the article consider independent learning as a specially organized training and creative activity of the teacher and student, aimed at self-organization, self-education and self-control. Attention is focused on the search for new approaches to the organization of independent educational and cognitive activities that can expand the scope of traditional teaching and learning. In the authors' opinion, information and communication technology plays an important role today in activating independent learning and systematization of the students' knowledge, information technology makes it possible to use both verbal teaching methods, search methods, and a creative activity based method including participation of both teacher and students.

Keywords: independent educational and cognitive activity, education.

Introduction

The fundamental requirement of a society for a modern school is the formation of a personality that would be able to solve scientific, industrial, social tasks independently, think critically, develop and defend one's point of view, one's beliefs, systematically and continuously replenish and renew one's knowledge by means of self-education, improve skills, and creatively apply these skills in practical work.

The changes taking place in the education system are also reflected in the Federal State Educational Standard for Basic General Education. Among the requirements for the results of the basic general education educational programme personal results (the readiness and ability of students to self-development) and meta-subject results (independence of planning and implementation of educational activities, construction of an individual educational trajectory) are singled out (On the approval of the federal state educational standard..., 2010).

In the Federal Programme for the Development of Education in Russia for 2016–2020, in the National Educational Doctrine of the Russian Federation 2025, in the Federal Law on Education in the Russian Federation, in the Federal State Educational Standard for Basic General Education the need for the formation of independent learning skills among schoolchildren is described as one of the main tasks of modern pedagogy (On the approval of the federal state educational standard..., 2010; On the National Doctrine of Education..., 2000; On the Federal Target Program..., 2015; On Education in the Russian Federation..., 2017).

Problem Statement

Independent learning is one of the important and widely discussed problems of teaching and learning in both schools and universities. Studies on this issue are connected with such areas as:

- defining the essence of the concept "students' independent learning" and the independent learning classification;
- studying methods and forms of independent learning activation;
- analyzing the volume and structure of independent learning;
- analyzing and developing ways of managing, planning and organizing independent learning in higher education and in general education institutions;
- the problem of motivating subjects of the educational process in the process of independent learning;
- the use of information and communication technology (ICT) as a means of organizing independent learning (electronic educational environments, software shells, elements of virtual and augmented reality, etc.).

The need to search for new approaches to the organization of independent educational and cognitive students' activity in modern conditions, when information and communication technology is an integral part of these conditions, is associated with resolving some contradictions between:

- requirements of the society to address new goals and objectives of education and the inability to implement them within the traditional didactic process;
- the need to create conditions that ensure the formation of the educational independence of schoolchildren and the unpreparedness of educational organizations to solve this problem;
- the need of educational organizations to organize independent learning with the use of ICT tools and the insufficient theoretical and practical development of the conditions for their use.

The urgency of solving these problems strongly requires a review of the established practice of organizing students' independent work on the basis of the introduction of information and communication technology.

Research Questions

The analysis of the scientific literature shows that the works of most authors are devoted to the organization of independent learning in higher education, as for the sphere of school education there is a shortage of studies.

In our opinion, when the objectives of mastering the educational disciplines are not directly affected and the content is not changed, the experience of organizing independent learning can be

practically realized within the framework of the Federal State Educational Standard for Basic General Education within the system of basic general education.

The theoretical experience of studying the essence of the concept “independent learning” is full of contradictions notwithstanding the apparent simplicity of the question.

Independent learning is considered by researchers as a method of training (Y.K. Babansky, L.V. Zharova, A.V. Usova, etc.); form of organizing the training sessions (B.N. Esipov, T.I. Shamova, L.G. Gendler, etc.); a specific type of educational activity (I.A. Zimnyaya, O.I. Nilson, L.D. Nikandrov, V.A. Kozakov, etc.); means of training (P.I. Pikadasisty, M.N. Skatkin, I.Y. Lerner, etc.); form of training (V.A. Slastenin, etc.); a doctrine that is determined by the ability to consciously set the goals and objectives, plan, implement and reflect the activity (A.B. Petrov, etc.); integral phenomenon that represents synthesis of: the forms of training activities and the means of organizing cognitive activity (O.V. Dolzhenko, V.L. Shatunovsky, etc.), the type of activity and organizational forms (E.K. Bortkevich, L.I. Ruvinsky, I.I. Kobylatsky, etc.); the means of acquiring knowledge and the type of training activity (A.B. Petrovsky, etc.); a variety of individual and group learning activities of students in the classroom or out-of-class carried out without direct teacher’s guidance, but when the teacher acts as the monitor (R.A. Nizamov, I.I. Ilyasov, V.Y. Lyaudis and other); a way of forming certain qualities of the individual: independence, initiative, and participation (N.N. Morozov, V.A. Petrova, T.I. Shamova, G.I. Sarantsev and others).

It is noteworthy that in foreign education there is not only the definition, but even the notion for the concept, equivalent to the term for student’s independent learning used in Russian education. At the same time, the priority of the individual in obtaining education abroad is great. This priority is expressed in a variety of concepts focused on the leading importance of self-management and self-organization in acquiring educational qualifications important for the individual. Here are some of these concepts: "self-regulating learning," "self-directed learning," "self-planned learning," "independent learning," "autonomous learning," "self-education," "self-study", etc. (Gnatyshina, 2013).

There are self-regulatory studies (T. Bidjerano, D.Y. Dai (Bidjerano & Dai, 2007), B.J. Zimmerman, D.H. Schunk (Zimmerman & Schunk, 2011)) and self-efficacy (A. Bandura, F. Kirschner, F. Paas, P. Kirschner (Kirschner, Paas & Kirschner, 2009)) that are part of self-organization. Self-regulation is associated with the metacognitive processes, motivation and behavioral processes that the learner uses to direct and control his learning (P.H. Winne, N.E. Perry (Perry & Winne, 2013), N.E. Perry, A. Rahim (Perry & Rahim, 2011), N.E. Perry, C.A. Brenner, N. Fusaro (Perry, Brenner & Fusaro, 2015), T.O. Nelson, L. Narens).

Most of the works are devoted to the study of self-organization of educational activities, as this ability is actively formed during the process of training.

Thus, D.H. Schunk and B.J. Zimmerman (Zimmerman & Schunk, 2011) regard self-directed work as a self-directed process of transforming mental abilities into educational skills; M. Martinez-Pons (Martinez-Pons, 2001) and M. Boekaerts (Boekaerts, 1999) – as a model element of the process of acquiring knowledge, L. Korno and E. Mandinach – as a set of learning strategies, K. Levy-Leboyer and F.E. Weinert – as one of the forms of competency.

Thus, independent work is viewed, on the one hand, as a kind of activity, stimulating participation, independence, cognitive interest, self-education, motivation for further professional development, on the other – as a system of events or pedagogical conditions that provide guidance for students’ independent activities (Troyanskaya & Savelieva, 2013).

Purpose of the Study

The analysis of psychological and pedagogical literature allowed us to clarify the concept "independent learning", which we consider as a specially organized educational and creative activity of the teacher and student, aimed at self-organization, self-education and self-control (Isakova, 2009).

Based on the definition of the concept, we can define the following tasks for student independent learning (Mikhailova N.S.):

- developing the ability to retrieve information independently, and to structure information;
- systematization of theoretical knowledge obtained, its deepening and expansion for application at the interdisciplinary level;
- developing projecting and research skills;
- developing skills to independently use educational, reference and special literature, legal and regulatory documentation;
- developing independence of critical thinking;
- improving the ability to self-organization, self-control and self-analysis of the educational outcomes;
- developing interpersonal skills;
- developing presentation skills for presenting the results of independent learning in various forms.

The traditional classroom instruction system is not capable to ensure the achievement of the requires outcomes by the majority of students to the full extent, since at the mainstream schools (one teacher for 20–30 students) it is difficult to implement an individual approach. B.E. Starichenko says: "...the weak link of the chain is the teacher's limited ability to speed up the information processes – the receipt, processing and transmission of information within the training" (Starichenko, 2013).

The use of ICT for organizing independent learning at school will allow adapting the traditional teaching and learning process to the individual characteristics of students and improve the assimilation of educational material through a variety of forms of activities, and strengthening the control over the process of instruction.

Research Methods

The Methods of theoretical study such as empirical analysis and synthesis, formalization, systematic method, as well as generalization of practical experience of using ICT in the independent student learning was employed for this research.

Findings

Independent learning, viewed as a whole as an activity, is a multifaceted and multifunctional phenomenon. It has not only educational, but also personal and social significance. Although it is agreed that independent learning is complex and important, nevertheless the terminology of independent learning is not defined, although its content is clearly interpreted by all researchers and practical works as purposeful, active, relatively free activity of the student (Zimnyaya, 1997).

The ICT offers opportunities to improve the organization of teaching and learning, increase the individualization of learning and the efficiency the students' self-training. The individualization of the teacher's work increases motivation for learning, provides an opportunity to attract students to research work and provides flexibility to the teaching and learning process, which, in turn, allows to take into account the motivation factor in the educational process (Akulova & Andreeva, 2010).

The interest in determining the role and place of modern information technology in the process of organizing the students' independent learning is stable, special interest is attracted to e-learning and m-learning, which indicates the need for further developments in this field. In this regard the number of publications in which researchers pay special attention to the interaction of participants within the training process, and try to rethink and reassess the positions of the teacher and students in a new way has increased.

The important role of information technology as a means of organizing independent student learning is considered in the studies by T.G. Bekisheva (Bekisheva & Gasparyan, 2013), E.V. Zakharova (Zakharova, 2008), T.I. Krasnova (Krasnova, 2015), Y.I. Melchenko (Melchenko, Ivanova & Golubeva, 2013), N.V. Mikhailova (Mikhailova, 2012), K.E. Osetrin, E.G. Pyanykh (Osetrin & Pyanikh, 2011), A.V. Pavlinov (Pavlinov, 2009), E.S. Peskova (Peskova, 2012), I.V. Robert (Robert, 2014) and others.

E.I. Starichenko suggests a different model, which is based on the systematic use of electronic educational tools of information and communication technology while solving didactic tasks and for managing the learning process (Starichenko, 2013). The model helps to ensure that all the trainees reach the required minimum of the academic discipline, on the one hand, and ensures reaching individual maximum of learning outcomes, from another other hand.

The model based on the use of the learning management system (LMS) allows a more efficient organization of the process of independent learning. The learning management system is the foundation of a learning activity management system – used to develop, manage and distribute online learning materials with shared access. The most widely used learning management systems are Blackboard, Edmodo, Google Classroom and Moodle.

N.V. Mikhailova underlines the advantages of modular object-oriented dynamic learning environment Moodle in front of the other systems for independent student learning (Mikhailova, 2012). The effectiveness of Moodle in the educational process is provided by such functional characteristics as design customization, modular character of the presented material, flexibility in managing the educational process, ease in publication of educational materials and their support in accordance with the format of international standards, user group management, application of Web 2.0 services and the opportunity of integration with other applications.

A fairly large potential has a virtual and augmented reality. Real studies of virtual reality in education and psychology are few. In education virtual reality is mainly used as a special information space, where the student can receive certain information, carry out contacts; and work out elements of scientific and educational project activities (Selivanov & Selivanova, 2014).

In addition to the advantages that implies using ICT for organizing independent learning, the researchers pay attention to a significant increase in the requirements for the teachers' qualification. The process of developing assignments for independent learning is growing more complicated, trainees should get feedback from the teacher at any stage of the work, considerable attention is paid to individual work (Pryakhina, 2006).

Conclusion

Thus, the use of interactive electronic educational resources contributes to the creation of conditions for the development of independent creative activity of students, due to the fact that training is carried out through the joint activity of the educational process subjects. The main pedagogical condition for the organization of the educational process on the basis of interactive educational resources is the connection of theoretical learning to practical work, which extends the opportunities of traditional teaching. In these conditions, a rational combination of collective and individual methods of cognitive activity is possible depending on the personality of the trainee. This contributes not only to the formation of knowledge and the development of the creative abilities of students, but also to their social growth.

The modern information and communication technology plays an important role in the organization of independent cognitive activity of the basic school students. The use of information technology makes it possible to adapt the traditional learning process to the individual characteristics of students for the successful mastering of educational material. The results of any activity including the use of information technology become public. This contributes to the social maturation of students, which is an important for the independent professional work.

References

- Akulova, T.N. & Andreeva, I.G. (2010). Organizing independent student learning at the Pedagogical Department within the structure of competency-based approach. *Competency-based approach as a conceptual basis of modern education. Collected articles*. Saratov, Information Center Nauka [in Rus].
- Bekisheva, T.G. & Gasparyan, G.A. (2013). Electronic means of teaching to increase motivation for student's independent learning. *Bulletin of Tomsk State Pedagogical University, 1 (129)*, pp. 136–139.
- Bidjerano, T. & Dai D.Y. (2007). The relationship between the big-five model of personality and self-regulated learning strategies. *Learning and Individual Differences, 17(1)*, P. 69–81.
- Boekaerts, M. (1999). Self-regulated learning: where we are today. *International Journal of Educational Research, 31*, pp. 445–457.
- Gnatyshina, E.A. (2013). Essence, goals and content of students' independent work in the modern educational process. *Vector of Science of Togliatti State University. Series: Pedagogy, Psychology, 4*, pp. 60–63 [in Rus].
- Isakova, T.B. (2009). *The essence of the concept of independent learning*. Retrieved from: <https://cyberleninka.ru/article/n/suschnost-ponyatiya-samostoyatelnaya-rabota> (accessed 26.04.2018).
- Kirschner, F., Paas F. & Kirschner, P.A. (2009). Individual and group-based learning from complex cognitive tasks: Effects on retention and transfer efficiency. *Computers in Human Behavior, 25(2)*, pp. 306–314.
- Krasnova, T.I. (2015). Supervision and support of students' activities in mixed education. *Siberian Journal of Life Sciences and Agriculture, 1*, pp. 556–567 [in Rus].
- Martinez-Pons, M. (2001). *The Psychology of Teaching and Learning: A Three Step Approach*. London: Continnum, 272 p.
- Melchenko, G.G., Ivanova, L.A. & Golubeva, N.S. (2013). ICT in teaching a course in Analytical Chemistry. *Higher education in Russia, 3*, pp. 155–158 [in Rus].
- Mikhailova, N.V. (2012). Specific features of organizing asynchronous training of university students in the electronic environment. *Vestnik of the Orenburg State University, 2 (138)*, pp. 149–154 [in Rus].
- On Education in the Russian Federation. Federal Law No. 273-FZ dated from 29.12.2012 (Amendment dated from 29.12.2017). *ConsultantPlus Legal Reference System*. Retrieved from: http://www.consultant.ru/document/cons_doc_LAW_140174/ (accessed 26.04.2018) [in Rus].
- On the approval of the federal state educational standard of basic general education. The order of the Ministry of Education and Science of the Russian Federation dated from December 17, 2010, No 1897. (2011). *Vestnik obrazovaniya v Rossii, 15*, pp. 39–65 [in Rus].
- On the Federal Target Programme on the Development of Education for 2016-2020. Decree of the Government of the Russian Federation dated from 23.05.2015 No. 497. *ConsultantPlus Legal Reference System*. Retrieved from: https://минобрнауки.рф/документы/5930/файл/4787/FCPRO_на_2016-2020_gody.pdf (accessed 26.04.2018) [in Rus].
- On the National Doctrine of Education in the Russian Federation. Decree of the Government of the Russian Federation No. 751 dated from 04.10.2000. *ConsultantPlus Legal Reference System*. Retrieved from: http://www.consultant.ru/document/cons_doc_LAW_97368/ (accessed 26.04.2018) [in Rus].
- Osetrin, K.E. & Pyanikh, E.G. (2011). Information technologies in organizing the students' independent learning. *Tomsk State Pedagogical University Bulletin, 13*, pp. 210–213 [in Rus].
- Pavlinov, A.V. (2009). Modern computer technologies as a means of schoolchildren independent learning. *South-Ural State Humanitarian Pedagogical university Bulletin, 10*, pp. 125–133 [in Rus].

- Perry, N.E. & Rahim, A. (2011). Studying self-regulated learning in classrooms. In B.J. Zimmerman & D.H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 122–136). New York: Routledge.
- Perry, N.E. & Winne, P.H. (2013). Tracing Self- and Co-Regulation of Learning in Events and Activities. In M. Vaurus & S. Volet (Eds.), *Interpersonal Regulation of Learning and Motivation: Methodological Advances*. Pergamon Press.
- Perry, N.E., Brenner, C.A., & Fusaro, N. (2015). Closing the gap between theory and practice in self-regulated learning: Teacher learning teams as a framework for enhancing self-regulated teaching and learning. In T.J. Cleary (Ed.) *Self-regulated learning interventions with at risk populations: Academic, mental health, and contextual considerations* (pp. 229–250). Washington, DC: American Psychological Association.
- Peskova, E.S. (2012). Strengthening the effectiveness of independent learning of schoolchildren by means of a learning system with feedback. *Tomsk State Pedagogical University Bulletin*, 4, pp. 38–41 [in Rus].
- Pryakhina, E.N. (2006). Opportunities of information technologies for organization and improvement of students' independent learning. *Candidate of Education abstract*. Tyumen [in Rus].
- Robert, I.V. (2014). *Theory and Methods of Informatization of Education* (Psychological, Pedagogical and Technological Aspects). Moscow. BINOM. Laboratory of Knowledge. 398 p. [in Rus].
- Selivanov, V.V. & Selivanova, L.N. (2014). Virtual reality as a method and means of teaching. *Educational technologies and society*, 3, pp. 378–391 [in Rus].
- Starichenko, B.E. (2013). Information and technological model of training. *Education and Science*, 4, pp. 112–120 [in Rus].
- Troyanskaya, S.L. & Savelieva M.G. (2013). *Competent approach to the implementation of independent work of students*. Izhevsk. Publishing House of the Udmurt State University [in Rus].
- Zakharova, E.V. (2008). *Organizing students' independent work with the use of information and communication technologies (on the example of a foreign language)*. *Candidate of Education thesis*. Yakutsk [in Rus].
- Zimmerman, B.J. & Schunk D.H. (2011). *Handbook of self-regulation of learning and performance*. Taylor & Francis.
- Zimnyaya, I.A. (1997). *Pedagogical Psychology*. Rostov on Don. Phoenix. 480 p. [in Rus].