European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com

e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2021.12.02.16

ICHEU 2021
International Conference «Humanity in the Era of Uncertainty»

PROBLEM MODELING AS A BASIS FOR PRACTICE-ORIENTED LEARNING IN THE DIGITAL ENVIRONMENT

Maria V. Fominykh (a)*, Bella A. Uskova (b), Natalia O. Vetlugina (c)
*Corresponding author

(a) Russian state vocational-pedagogical university, Mashinostroiteley Street 11, Yekaterinburg, Russia
fominykh.maria12@yandex.ru
(b) Russian state vocational-pedagogical university, Mashinostroiteley Street 11, Yekaterinburg, Russia,
bouskova@mail.ru
(c) Russian state vocational-pedagogical university, Mashinostroiteley Street 11, Yekaterinburg, Russia,
vetlugina_no@rambler.ru

Abstract

The relevance of this article is to explain the necessity and feasibility of introducing problem modeling as an approach and to identify the conditions for the use of multimedia technologies in the modern educational process, namely, in the context of distance learning. The transition of work to an online and mixed learning format during the COVID-19 pandemic has become a new phenomenon for the higher education system. The experience of using multimedia technologies in this case allows us to look at the problem of introducing innovative teaching methods from a different angle. The importance of motivation in learning is difficult to overestimate, and problem modeling as an innovative approach has a huge motivational potential. The article reveals the conditions of problem modeling in terms of the motivational potential of this approach. The conditions for the use of multimedia technologies in the framework of problem modeling are highlighted, and examples of practice-oriented tasks with the use of multimedia technologies in the context of problem modeling are given. The practical significance of the research lies in the theoretical definition of the author's concept of problem modeling as an approach. The conditions presented by the author for the use of multimedia technologies and practice-oriented tasks can be introduced into the practice of working with students of pedagogical specialties.

Keywords: Innovations in education, multimedia technologies, problem modeling, motivation, foreign language teaching

https://doi.org/10.15405/epsbs.2021.12.02.16
Corresponding Author: Maria V. Fominykh
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

Modern students are brought up under the influence of information technologies, many are familiar with multimedia from school; many educational centers, schools, and exam preparation courses have multimedia projectors, motorized projection screens, acoustic systems, interactive whiteboards, online conference tools, and educational platforms. Multimedia technologies have spread everywhere in all spheres of human life, and among young people, namely, students, they occupy the first place. In this article, the authors consider this type of technology as a new element of the learning system in the context of problem modeling. Problem modeling is the author's innovative approach to teaching, based on the motivational basis of training, which provides a practice-oriented nature of studying the disciplines of the profile cycle of the curriculum. Sustainable motivation to learn is the key to successful future professional activity, which is important in today's society, which needs highly qualified and competitive specialists.

The theoretical basis of the research was the fundamental works on pedagogy and psychology (Babansky Yu. K., Leontiev A. N., Krayevsky V. V.,); modeling theory (Borisova N. V., Buslenko N. P., Gastaev Yu. A., Maksimova V. N.); theory of pedagogical design and modeling (Bespalko V. P., Verbitsky A. A., Gromyko Yu. V., Klarin M. V.); modern developments of pedagogical science in the field of organizational forms of education (Krayevsky V. V.); the problem of designing pedagogical technologies (Bespalko V. P., Serikova V. V., Choshanova M. A.); theory of readiness for professional activity (Zhukov G. N., Zeer E. F., Slastenin V. A.).

The purpose of the study is to identify the need to develop conditions for the use of multimedia technologies in the framework of problem modeling as an innovative approach. The article presents the conceptual foundations and pedagogical conditions of problem modeling as an innovative approach, and provides examples of practice-oriented tasks with the use of multimedia technologies. It is important in the article to establish the connection between motivation for learning and multimedia technologies in the framework of problem modeling.

The scientific novelty of the research is determined by the introduction of a system of practice-oriented tasks with the use of multimedia technologies in the framework of problem modeling as an innovative approach to learning. As a result, it is proved that with the use of multimedia technologies in the context of problem modeling as an innovative approach, students' level of motivation to learn increases.

The practical significance of the research lies in the theoretical definition of the author's concept of problem modeling as an approach; the conditions presented by the author for the use of multimedia technologies and practice-oriented tasks can be used in the practice of working with students of pedagogical specialties.

2. Problem Statement

In the modern educational process, teachers are faced with a variety of approaches to learning; they have to make a choice in favour of one or another approach, to study its pedagogical and educational potential. Problem modeling as an innovative approach is based on the principles of creative pedagogy and problem-model learning.

https://doi.org/10.15405/epsbs.2021.12.02.16
Corresponding Author: Maria V. Fominykh
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

3. Research Questions

In the summer of 2017, the Government approved the national program "Digital Economy of the Russian Federation", which identified five basic directions for the development of the digital economy for the period up to 2024. Education is indicated as one of the directions, and the key goal is improving the education system, which should provide the digital economy with competent personnel (Chupina et al., 2016). It follows from this that the training of future teachers should be practice-oriented, because it is with this type of training that the graduate is able to conduct an effective and efficient professional activity. Thus, the need for effective training of future teachers is a priority.

As modern foreign study show, education in the world is on the path of inevitable innovation (Saito et al., 2020). The development of the system of pedagogical education in Russia continues through research and practical implementation of modern principles of professional pedagogy, one of which is the principle of prospectively advanced training of future teachers. Our comparative analysis of the trends in the modern training of teaching staff in Russia and abroad shows the commonality and difference of some approaches to this problem. Foreign pedagogy in the field of training future teachers is more practice-oriented. It should be noted that alternating training (sandwich training) is gaining popularity in Russia. The importance of a practice-oriented orientation of the educational process can hardly be overestimated. Taking some positive experience in this area, it should be noted that it is important to introduce problem modeling as an approach to learning (Decree of the President of the Russian Federation…, 2018).

4. Purpose of the Study

The purpose of this study is to describe, analyse and present the developed structure of interaction of subjects of the educational process in terms of the problem-model approach.

5. Research Methods

The leading approach to the study of this problem is the generalization of the pedagogical experience of domestic and foreign scientists in the field of the use of multimedia technologies in teaching, the problem-model approach, and motivation for learning. To achieve this goal, a theoretical analysis of psychological and pedagogical literature was carried out, and pedagogical experience was generalized.

6. Findings

We define problem modeling in training as an innovative approach that encourages learning based on the merger of practice-oriented profile and educational activities, focusing on the organization of this activity by building the actual developed models in the process of problem situations in the implementation or modeling of professional activities.

It should be noted that problem modeling has been successfully implemented in the educational process of the Russian State Vocational Pedagogical University on the basis of the Department of Germanic Philology. Problem modeling, in our opinion, has a high motivational potential.

https://doi.org/10.15405/epsbs.2021.12.02.16
Corresponding Author: Maria V. Fominykh
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

A foreign language, mainly English, is the compulsory subject in the curriculum of any university. Without learning a language, students will not master the competencies of a highly qualified specialist and will not be competitive on a labour market, which also motivates students to study.

In adult life, a person still feels the need for knowledge and communication in foreign language. Multimedia technologies here have an advantage over other types of technologies, since (Coorough, 2001; Kushcheva & Terekhova, 2018; Weitze, 2016; Wylie, 2015):

- visual and audio effects help you learn a foreign language better;
- a significant part of the classes can be conducted in an interactive format;
- the use of individualized programs ensures the use of multi-level tasks;
- the development of real-world programs in the context of problem modeling successfully helps in future professional activities.

Motivation in learning a language is based on the fact that a language can be both a goal and a means of teaching: for instance, when reading a book, watching a movie, learning about the life of idols, schoolchildren learn the language as well (Saito et al., 2020). In other cases, the motivation for studying a language is the desire to go to a country where the language is actively used; studying the culture and history of these countries.

There are three main motivational points when learning a foreign language: socialization, learning new things and the need for communication. These points echo the listed features of learning a foreign language (Acosta & Lozano, 2019).

All these conditions are also characteristic of other disciplines. Some scholars consider the pleasure of learning to be the main motivator (Almyashova & Mityakina, 2012). Kazakova (2011) sees a possible way to develop motivation in learning a foreign language in implementing educational and telecommunications projects.

As noted above, problem modeling as an approach has a huge motivational potential, therefore, the conditions for problem modeling will be:

- variability of the content of specialized academic disciplines;
- mutual interactivity (in the modes student-student, student-group, student-teacher, group-teacher);
- individualization of learning (personal educational trajectory of each student);
- non-linearity of the passage of educational material;
- parallel and concentric study of the material of specialized academic disciplines and industrial practices.

We will highlight the conditions for the use of multimedia technologies in the framework of problem modeling:

1. The teacher has the skills to work with these technologies and tools outside the field of education, knowledge of their structure.

2. Students have basic skills in working with multimedia technologies and are ready to participate in online based workshops and webinars.

3. Availability of Internet access.

https://doi.org/10.15405/epsbs.2021.12.02.16
Corresponding Author: Maria V. Fominykh
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

4. Determining the scope of multimedia technologies directly in the classroom (according to the structure and stages of the lesson).

5. Drawing up a list of the material to be worked out (determining the topics to be learned only with the help of multimedia technologies).

6. Clarification and specification of contradictions in the assessment of the complex application of this type of technology.

7. Presentation of information about the projected result of working with multimedia technologies to students and / or colleagues.

8. Cloud environment for providing / publishing information.

9. Proactive consideration of the positive and negative consequences of the introduction of this type of technology.

Here are examples of practice-oriented tasks with the use of multimedia technologies in the context of problem modeling:

1. Develop a web page, presentation, tag cloud (to choose from) by topic: "Preparing an interpreter to work with special vocabulary».

2. Using the Prezi online service (User's Guide to Working with Prezi http://oprezi.ru/o-prezi.html), create a presentation on the topic "Analysis of a website for learning a foreign language (to help a student, high school student, translator)".

3. Using the OnlineTestPad Test Constructor (reference information about the basics of the OnlineTestPad Test Constructor http://onlinetestpad.com/ru-ru/HelpSection/Basics-of-testmaker-2/Default.aspx), create a foreign language test.

4. Develop a presentation (4-7 slides) on the topic: Features of the work of a translator in a state institution, bank, legal, insurance, consulting company, translation agency.

5. Using ready-made templates of the online service ClassTools (User's guide to creating didactic online games https://sites.google.com/site/badanovweb2/home/classtools-net), create 2 didactic games. Develop mini-lesson plans for a foreign language, which reflect the use of didactic games created by you.

Distinctive features of problem modeling in the context of practice-oriented learning are: flexibility, automation, stability, consciousness. Let's take a closer look at these features:

1. Flexibility reflects the independence of the skill, i.e. transferring a skill without taking into account the skill in which it is included. This feature is necessary when included in the created new simulated professional situation.

2. Automation manifests itself at a subconscious level, characterized by minimal control from the side of consciousness during the implementation of selected operations.

3. Sustainability is characterized by the error-free execution of simulated operations in the course of future simulated or real professional activities.

4. Consciousness is a student's conscious self-control in case of difficulties or errors in building models.

The content of the Federal State Educational Standard of Higher Education presupposes the orientation of the subject content of academic disciplines towards mastering the basic sciences as the basis for the integration of pedagogical knowledge. It is important for learners to learn in a practice-oriented

https://doi.org/10.15405/epsbs.2021.12.02.16
Corresponding Author: Maria V. Fominykh
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

manner; studies in the field of readiness for professional activity indicate that practical training has the advantage over theoretical training.

We believe that the scientific and methodological system developed by us with the use of problem modeling is a good basis for practice-oriented learning.

The essence of this system is that during training a problem-model environment is created, defined as a set of conditions that ensure the implementation of educational activities with the use of simulated problem situations in a certain subject area with the help of the means of problem-model technologies, dialogue interaction between a teacher and a student, aimed at determining the design of alternative scenarios for their professional future within the framework of one discipline of the profile cycle.

As part of the study, we carried out an experimental search work to test the effectiveness of the scientific and methodological system using problem modeling. The criteria for the effectiveness of the proposed and tested system were:

- training of students in specialized academic disciplines;
- the level of development of profile and special competencies;
- the results of complex testing in specialized academic disciplines;
- student rating;
- portfolio development;
- assessment of employers' satisfaction with the level of professional competence of graduates.

The results of the experimental research work are presented in Table 1Under the conditions of the proposed system, students enrolled in the main professional educational program of higher education (bachelor's degree) implemented at the Russian State Vocational Pedagogical University in the direction of 44.03.01 Pedagogical education and training profile "Education in the field of a foreign language (English)", study such specialized disciplines as: methodology of teaching a foreign language, introduction to linguistics, linguistic and cultural studies, the basics of research work, theory and practice of translation, stylistics, literature of the countries of the target language, etc., and a number of practices: practice for obtaining primary professional skills and abilities, pedagogical practice, pre-diploma (undergraduate) practice.

During the training, students receive practice-oriented assignments from teachers of specialized academic disciplines.

These tasks must necessarily be related to future professional activities, be problematic and heuristic in nature.

Thus, the student studies the topics of the profile discipline and at the same time learns to apply new knowledge in practice.

https://doi.org/10.15405/epsbs.2021.12.02.16
Corresponding Author: Maria V. Fominykh
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Table 1. Results of experimental research work (ERW). Analytical map of the experimental search work to test the effectiveness of the scientific and methodological system in the framework of problem modeling

Performance criteria of the scientific methodological system	Indicators	before ERW	after ERW
Training Levels	Starting	41%	4%
	Basic	21%	24%
	Creative	38%	72%
Competences Development Levels	Basic	47%	10%
	Average	18%	21%
	High	35%	69%
Testing Results (Points)	Five.	12%	53%
	Four.	44%	35%
	Three.	44%	12%
Student Rating (Points)	55-70.	45%	12%
	71-85.	19%	45%
	86-100.	36%	43%
Portfolio (Points)	Five.	17%	79%
	Four.	13%	17%
	Three.	70%	4%
Assessment Of Employers' Satisfaction With The Graduates' Professional Competence Level	Satisfied	9%	61%
	Not Fully	33%	31%
	Not Satisfied	58%	8%

Practice-oriented learning contributes to the student's self-educational activity, which is important today, in the modern world, with a rapidly changing reality. For example, many modern researchers emphasize the relevance of the problem of adaptation of university students in conditions of self-isolation to learning with the use of distance learning technologies (Chapaev et al., 2016; Chupina et al., 2016; Fedorov et al., 2015). They also bring the problem of modeling vocational and educational activities to the forefront (Fominykh, 2016; Fominykh et al., 2016). The problem modeling, in turn, can solve a number of these problems.

Thus, we come to the following conclusions: problem modeling is one of the new approaches in education, which is focused on the rapid change in the activities of both teachers and students in today's rapidly changing reality in the educational environment. Subject to the didactic conditions of practice-oriented teaching in the context of problem modeling, it is possible to successfully implement effective teaching for the development of profile and special competencies of university students.

7. Conclusion

Thus, we come to the following conclusions: problem modeling is one of the priority innovative approaches in education, and the training and motivational capabilities of problem modeling are quite large. If the didactic conditions for the use of multimedia technologies in the context of problem modeling are met, it is possible to successfully implement effective training for the development of specialized and special competencies of university students. Modern society needs to encourage educational organizations to implement problem modeling in training, as well as to organize the training of teaching staff of educational organizations on the implementation of problem modeling and multimedia technologies in training in the system of in-service training and refresher courses. We see the prospects for further research

of the problem in a more detailed study of problem modeling in the preparation of the student for direct professional activity, as well as the development of diagnostic tools with the use of multimedia technologies in order to activate the independent practice-oriented work of students.

References

Acosta, A., & Lozano, C. (2019). University social responsibility practices: contributions to the construction of peace and social fabric. *En la educación 4.0: Tecnología e innovación, ciencia e investigación. Editorial CIMTED.* http://memoriascimted.com/wp-content/uploads/2020/02/Libro-de-Investigaci%C3%B3n-La-educaci%C3%B3n-4.0.pdf

Almyashova, L. V., & Mityakina, O. V. (2012). Teaching a foreign language in a technical university: organization of extracurricular work as the development of positive motivation. *Russian mobilis, 6*(39), 124-129.

Chapaev, N. K., Erofeev, A. G., & Dvořáková, L. (2016). Peculiarities of Educational Environment at Mining and Metallurgical Schools of the Urals. *International Journal of Environmental and Science Education, 11*(14), 7066-7078.

Chupina, V. A., Pleshakova, A. Y., & Konovalova, M. E. (2016). Methodological and Pedagogical Potential of Reflection in Development of Contemporary Didactics. *International Journal of Environmental and Science Education, 11*(14), 6988-6998. http://www.ijese.net/makale/974

Coorough, C. (2001). *Multimedia and the Web: creating digital excitement*. Harcourt College Publishers.

Decree of the President of the Russian Federation of May 7, 2018 No. 204 "On national goals and strategic objectives of the development of the Russian Federation for the period up to 2024". (2018). https://www.garant.ru/products/ipo/prime/doc/71837200/

Fedorov, V. A., Stepanov, A. V., & Stepanova, T. M. (2015). Composite pedagogical staff-clusters as a condition of department educational and methodical work development. *The Education and science journal, 9,* 36-50. (In Russ.) https://doi.org/10.17853/1994-5639-2015-9-36-50

Fominykh, M. V. (2016). The game simulation as a method of training for teachers of a higher school. *Bulletin of Science and Practice. Electronic Journal, 11*(12), 339-341.

Fominykh, M. V., Uskova, B. A., Mantulenko, V. V., Kuzmina, O. N., & Shuravina, E. N. (2016). A Model for the Education of a Student of a Vocational Pedagogical Educational Institution Through the Gaming Simulation. *IEJME-Mathematics Education, 11*(8), 2814-2840.

Kazakova, Yu. L. (2011). International telecommunications project as an effective way to form the communicative competence of schoolchildren and increase motivation to learn a foreign language. *Psychology and pedagogy: methods and problems of practical application, 20,* 363-367.

Kushcheva, N. B., & Terekhova, V. I. (2018). *Modern digital educational environment in higher education in Russia*, *1*(65), 191-194.

Saito, E., Hang Khong, T. D., Sumikawa, Y., Watanabe, M., & Hidayat, A. (2020). Comparative institutional analysis of participation in collaborative learning. *Cogent Education, 7*(1). https://doi.org/10.1080/2331186X.2020.1779556

Weitze, C. L. (2016). Designing for learning and play: The smiley model as a framework. *Interact. Des. Archit., 29*(1), 52–75.

Wylie, J. (2015). *Mobile learning technologies for 21st century classrooms.* Retrieved on June 7, 2021 from: http://www.scholastic.com/browse/article.jsp?id=3754742