Environmental engineering students’ motivation through foreign language learning in the context of digital teaching realization (on the example of Moodle virtual environment)

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Abstract. The article analyzes the ways digital teaching implementation during the process of foreign language learning by future environmental engineers. The relevance of the work is the need of society for highly qualified specialists with foreign language communication skills. The theoretical significance of the study is in the fact that ways of digital teaching implementation are considered. The practical significance of the given paper is in the development of electronic educational and methodological complexes for various levels on the Moodle platform education during the process of foreign language learning, which allow to stimulate the desire for students’ motivation to success, effectively organize independent activities and enhance students’ cognitive activity.

“Motivation of success and fear of failure (questionnaire of A. A. Rea) was applied in the empirical study. The results showed that learning in virtual reality leads to increased motivation and involvement of students in the learning process. It is concluded that the competent organization of independent work in a virtual educational environment and the use of modern tools improve the quality of future environmental engineers’ professional training.

1 Introduction

One of the subjective of “the long-term development of the country is the education system reform, which has posed the problem of modern society quality for modern society” [1, p. 95]. The widespread introduction of interactive teaching methods through the virtual environments application is becoming a priority for improving the quality of professional becoming” [2, p. 195]. To be ready to integrate successfully into this environment, everyone needs to be motivated to learn IT. The virtual environment creates face-to-face meetings and provides various tools for collaboration: Web meetings; virtual classes; virtual learning environment; virtual world” [4, p. 69].

The era of society cybersocialization has come, which is characterized by a set of “qualities acquired by a person that ensure the ability to organize life in cyberspace in the present and future” [4, p. 69].

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context of performing various social functions as a subject of network communities, and not as a sovereign personality” [3, p. 120].

The great role in person’s becoming as a professional belongs to the quality of higher education [4]. At present, practice-oriented education is aimed at modernizing the methodological system of education through the use of digital learning tools, which justifies the choice of this topic in terms of the expediency of its development for practical application in the methodology and technology of professional education.

The relevance of the work is the need of society for highly qualified specialists with foreign language communication skills. The theoretical significance of the work is in the fact that digital means in teaching a foreign language in a university setting are considered. The practical significance of the study is in the possibility of applying the presented results in the educational process of the university in order to form foreign language communication skills in future environmental engineers.

Environmental engineers focus on information gathered from the natural surroundings, particularly data on future effects of human health. Graduates are prepared to solve the problem of the quality of life that’s why they should master the communicative skills as well as be highly motivated to achieve the best results in order to “contributed greatly to the progress of environmental thought which keeps the phenomenon of the quality of living constantly in the agenda” [5, p. 23].

2 Materials and methods

2.1 Methods of study

The objective of the paper is analyzes of ways of digital teaching implementation in the university in the context of foreign language learning by future environmental engineers.

For this goal, it is necessary to solve the following tasks: to consider the concept of "digital learning", ways to implement digital learning of a foreign language, as well as possible problems, risks and prospects.

Two methods of study were used by us: theoretical analysis and an empirical study. Theoretical research methods made it possible to systematize information on digital technologies, to identify the relationship between traditional and digital education.


V. G. Perchatkina, J.N. Ziyatdinova study academic and career motivation of future engineers through foreign language teaching and learning [15]. They proved that the foreign language course implied the development of students’ intercultural and professional competencies.
2.2 Participants

The current study involved N = 20 education students which are studying at Polytechnic Institute, Sevastopol State University (direction of training – environmental engineering), (67% female, 33% male, Mage = 19) who voluntarily attended foreign language classes. The sample size is sufficient for detecting moderate group differences and changes in motivation growth.

2.3 Measures

Motivation is most commonly measured using personality assessments. "Motivation of success and fear of failure (questionnaire of A. A. Rean) was applied in the empirical study. Respondents had to answer the certain questions, choosing the «yes» or «no» quickly, without thinking for a long time. The answer that comes to mind first is usually the most accurate.

3 Results

Digital learning tools are represented by interactive systems that allow to work simultaneously with sound, video frames, animated computer graphics, static images. There is an impact on students through various information channels. For example, the flow state theory, put forward by psychologist Mihaly Csikszentmihalyi [16], is based on a certain mental state in which a person is completely immersed in what they are doing. The flow state is characterized by an increased level of interest, maximum involvement in the process, memory activation, as well as getting pleasure and satisfaction from the task. Being in this state, students assimilate information better, use their problem-solving and communication skills more effectively.

Virtual reality allows to replicate positive learning experiences by immersing students in an optimal state through intrinsic motivation, well-defined goals, adjustable difficulty levels, and timely feedback. This motivation deals with the development of cognitive motives and interest in the future profession [15, p. 22]. According to the theory of learning motivation, it is extremely important to form and maintain their intrinsic motivation in order for students to achieve high-quality knowledge and skills in the context of foreign language learning. Intrinsic motivation reflects the student's interest in the learning process itself, the desire to master skills and gain knowledge [17]. High intrinsic motivation is directly related to the improvement of students' educational results, their self-confidence and initiative. VR or any information and communication technologies (ICT) allow to support the internal motivation of students when performing complex and complex tasks.

"Foreign language is a subject in which the creation of an artificial language environment for students is supposed. It predetermines the variable inclusion of various digital learning tools in new prospects for teaching a foreign language" [10].

The concept of "digital learning" is associated with the principles, patterns and mechanisms of students' assimilation of subject knowledge, skills, competencies, including the readiness to use a computer. ICTs have become an integral part of teaching foreign languages. Their use is carried out in the following forms: a computer as a tutor acting as a teacher (used to systematize acquired skills) and as a mechanism that simulates a certain environment and students perform actions in it [18]. Learning in virtual reality increases the involvement of students, thereby increasing their concentration on completing the task. As a result, students put more effort into directing cognitive resources towards solving complex problems [19].
Despite the fact that computers are actively used in teaching foreign languages, there are a number of problems and risks regarding their implementation in teaching foreign languages [11]. The first one, in our opinion, is that there is no pedagogical theory of digital learning in the world pedagogical theory, on which university lecturers could be based during their classes. That is, educators have nothing to rely on before designing and using ICT technologies. In this regard, many teachers do not take digital learning seriously and are in no hurry to use ICT technologies in their professional activities. In addition, the process of education in the university is realized through communication between students and lecturers. However, the possibility of forming the creative thinking of the individual, which is dialogic in origin, may be missed [5].

Communication (interactive, communicative, and perceptual) consists of two aspects – "verbal and non-verbal, which include "body language" (body movements, eye expression, etc.) and extralinguistic, sound characteristic features of speech (pitch, intonation, tone, etc.) [5, p. 23]. Therefore, the computer is not able to turn information into knowledge, values into meanings. In this regard, many scientists say that there is a real risk of degradation not only of speech, but also of thinking [20]. Research suggests that the “digital generation” tends to have mostly fragmented thoughts and superficial reasoning. In addition, literacy suffers. Moreover, with digital learning, educational work with students does not take place.

"The learning process can be successful and contribute to the psychological and emotional development of students if a virtual environment is used” [2, p. 196]. So, a well-known study by Yu-Li Chen shows that "the linguistic context recreated in a virtual environment helps students to replenish the vocabulary of a foreign language” [21, p. 637]. In Sevastopol State University (SevSU), when teaching a foreign language, subject and professional content is integrated, professionally oriented educational materials are developed, while Blended learning technologies are applied, including the virtual reality – Moodle learning management system. It is a virtual tool, which is a free web application for the possibility of organizing online learning. Blended learning has been organized in SevSU to take into account both the risks and benefits of the digital educational environment (Fig. 1).

Fig. 1. Moodle digital environment

The use of Moodle learning management helps to increase the motivation to study IT. Modeling of motivations occurs "through secondary needs - an incentive to act in a virtual environment” [1, p. 95] through a virtual tool. Secondary needs are acquired and realized with experience in the course of its knowledge. Moodle learning virtual environment can serve as a medium for active experiential learning and as a tool for developing problem-solving skills and behavioral characteristics.
According to the Regulation on the creation, examination and placement of electronic educational resources No. 02-08/403, which was adopted by the decision of the Academic Council of SevSU in 2018, online courses are being developed and actively implemented at all levels of education in the Moodle digital environment. Each course has a target group (fields of study and profiles, course, semester, form(s) of study and final assessment). The courses use innovative teaching technologies. Explanations are provided for the schedule, types of control, technologies and teaching aids, which are presented in text and graphic form, audio and video materials.

The predicted educational results of teaching a foreign language are formulated in a competency-based format. The course structure may include promotional videos, a forum, chats. The learning process creates an effective didactic environment with ample opportunities, producing qualitatively new properties that are not contained in traditional methods.

The development of topic-based planning for a virtual learning environment differs significantly from traditional one. In traditional thematic planning, everything is known: how many hours are allocated for lectures, what practical classes should be “fitted” into certain time frames.

To work in a virtual educational environment, the development of thematic planning requires a different approach (Table 1).

Table 1. Basics of learning in Moodle

<table>
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<tr>
<th>Contact work</th>
<th>Classroom work</th>
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<td>Extracurricular</td>
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<td>Independent work</td>
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<td>There will be…</td>
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Contact work: Classroom work

Classroom work: Traditional classroom lectures and practical classes are held according to the schedule in the classrooms of the university.

Contact work: Classroom lectures and practical classes, as well as lectures and classes based on technology webinar are held according to the schedule in the classrooms of the university and virtual classroom.

Extracurricular: in a closed online course

Independent work: Formally (conditionally)

Independent work: Lecturer-controlled

Student self-control


An important part of the virtual environment is a social space in which lecturers and students can interact using various virtual tools and not only act as an active side of learning, but are also co-creators of this virtual space and are motivated to learn [1, p. 95].

Classes in such conditions make it possible to simulate a complex visual-spatial-auditory environment with many stimuli and the possibility of immersion in the material broadcast with various incarnations, with the possibility of performing actions with virtual objects and objects that contribute to obtaining a complex experience.

At the stage of organizing the educational process, the possibilities of using innovative tools for collaboration, for example, a forum, are determined. They are limitless: they allow to discuss research, analyze statements, fix your answer, your reasoning, leave feedback on the opinions of a colleague; not see the answers of others until you answer yourself. The educator has an opportunity to observe the process of formation of scientific thoughts.
students' positions on various issues, where it is important to correct, ask questions, initiate activity, encourage activity and participation in the forum, leave their opinion, thereby emphasizing their presence in the learning environment. By setting limits (for example, in terms of volume), the lecturer has the opportunity to teach how to structure thoughts, express themselves in essence, present their own positions and views”.

An empirical study was carried out in order to determine the level of motivation to learn a foreign language after the introduction of ICT. “Motivation of success and fear of failure (questionnaire of A. A. Rean)” was applied in the empirical study. Respondents had to answer the certain questions, choosing the “yes” or “no” quickly, without thinking for a long time. The answer that comes to mind first is usually the most accurate.

The following requirements should be taken into consideration:

1) If the number of points scored is from 14 to 20, then the motivation for success (hope for success) is diagnosed.
2) If the number of points scored is from 8 to 13, then it should be considered that the motivational pole is not pronounced. At the same time, it can be borne in mind that if the score is 8.9, there is a certain tendency of motivation for failure, and if the number of points is 12.13, there is a certain tendency of motivation for success.
3) If the number of points scored is from 1 to 7, then the motivation for failure (fear of failure) is diagnosed.

Success motivation refers to positive motivation. With such motivation, a person, starting a business, has in mind the achievement of something constructive, positive. At the heart of human activity lies the hope for success and the need to achieve success. Such people are usually confident in themselves, in their abilities, responsible, proactive and active. They are distinguished by perseverance in achieving the goal, purposefulness.

People who are motivated to fail tend to have increased anxiety and low self-confidence. They try to avoid responsible tasks, and if necessary, solving super-responsible tasks can fall into a state close to panic. At least, their situational anxiety in these cases becomes extremely high. All this, at the same time, can be combined with a very responsible attitude to any activity.

The survey data are presented in Figure 1. They showed that the motivation and interest of the respondents after the period of foreign language learning by means of VR has significantly increased.

Fig. 1. Motivation forming level changes on the control and final stages

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<tr>
<th>Control stage</th>
<th>High level</th>
<th>Medium level</th>
<th>Low level</th>
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<td></td>
<td>20</td>
<td>15</td>
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<table>
<thead>
<tr>
<th>Final stage</th>
<th>High level</th>
<th>Medium level</th>
<th>Low level</th>
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<td></td>
<td>25</td>
<td>20</td>
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The results of control stage showed that a high level in 24% of students; medium - 32%; low - 44%.
The following results of final stage were revealed: a high level in 60% of respondents; medium - 27%; low - 13%.

4 Discussion

Thus, university lecturers have the opportunity to create a unique system for learning, which is a set of interrelated elements that form a certain unity and allow organizing the process of teaching a foreign language in new conditions.

With digital learning, the principle of individualization is implemented. But at the same time, students are completely isolated from each other, which leads to a lack of development of the individuality of each through others. That is, it turns out that the principle of individualization in digital learning is the work of a student without an instructor and accompanied by a lecturer with a computer. All this can lead to a separation of the student from education, decrease the opportunity for full-fledged mental development.

Learning is an active process of filtering, selecting and structuring information based on previous knowledge. Therefore, teaching a foreign language includes cognitive processes that create connections between perceived information of various modalities. According to the theory of multimedia learning, a VR application can provide complementary (complementing each other) auditory and visual information to students, as well as provide an optimal cognitive load on the information channel.

The conducted analysis demonstrates that the characteristics of Moodle virtual environment increase its potential as an educational technology. The virtual environment allows to form skills based on the context, control the level of cognitive load, and also form the complex mental functions.

Moreover, learning in virtual reality leads to increased motivation and involvement of students in the learning process.

5 Conclusions

So, methodologists and specialists in the field of education are faced with the task of developing an adequate psychological, pedagogical and pedagogical theory on the use of digital tools in teaching foreign languages.

It is noted that the "digital generation" has a number of features:
– it is difficult for students to communicate with each other in the real world, make new acquaintances;
– communication occurs mainly through the screens of mobile devices;
– visual language replaces the usual plain text in virtual communication;
– when viewing information using computer technology, students manage to view a lot of texts, so the speed of information perception increases, but they hardly keep their attention on one subject;
– students are more accustomed to perceive a short informative text;
– the authority of mentors decreases; students trust the Internet more;
– social and gender orientations are not accurate, students have problems of self-identification;
– modern youth receives all the information from the Web, which is not correct.

In this regard, it can be concluded that digital tools provide an opportunity to create a unique system for learning, which is a set of interrelated elements that form a certain unity.
6 Prospects for further research

Prospects for further research may be issues aimed at describing the pedagogical patterns of students' professional development, while the patterns of personal becoming of a student in the system of continuous education should be investigated.

References


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