

Student's information competence development: Experience and prospect

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Abstract. In the article the pedagogical interaction effectiveness for student's informational competence development within informational-educational environment is analyzed. The concept of pedagogical interaction, interactive tools of informational-educational environment, training methods for student's informational competence development are described. Sholom-Aleichem Priamursky State University served as an experimental base. The purpose of the experiment is to analyze effectiveness of interactive informational-educational environment tools used to create pedagogical interaction for the development of student's information competence. Two groups were selected for research: experimental (66 students) and control (69 students). Quantitative indicators of the dynamics testify the effectiveness of the experimental work: control group shows 4.4 percent progress while the experimental have 22.7 percent.

Keywords: Information competence, pedagogical interaction, university informational-educational environment

1 Introduction

The main peculiarity of higher education at this stage of evolutionary development is the availability of a large number of hardware and software tools to support the educational process. This is due to the emergence of modern educational concepts, such as Ubiquitous learning (U-learning) [1]. It implements the availability of training everywhere using any device capable of working with the web or its locally implemented components. Accordingly, faculty members devising the way of teaching their subjects increasingly use tools that provide an indirect access to educational material, assignments, consultations, that is, through specially organized interactive tools. The majority of documents regulating such an organization of the educational process use the term "Informational-educational environment", in which the student is immersed in the process of learning. However, the meaning of this term is too broad to describe the tools used to organize the training;

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therefore, the more precise concept of “interactive tools of the informational-educational environment” is introduced. These tools give professors and lecturers an opportunity to organize an out-of-class activity of a student in a discipline, including the processes of indirect interaction, group work, etc., that is the processes of pedagogical interaction.

Learning management systems (LMS), i.e. ready-made kits (Moodle, Canvas, Edmodo, etc.) as well as specifically developed ones for a particular educational organization are often singled out among the interactive tools of the Informational-educational environment (IEE). LMS usually take the central place in the IEE because of some reasons connected with fulfilling the greater part of functions which are necessary for organizing pedagogical interaction. However, when a professor or a lecturer has an idea of conducting some classes in an informal way, these LMS happen to have defects, which cannot be repaired even with the help of extensions (plug-ins). Besides, many students do not actively seek socialization within the “imposed” system, preferring social networks to it. These problems help to recognize the fact that LMS being undoubtedly one of the most important elements of the interactive tools of the IEE need additional software to ensure the effectiveness of the learning process.

Moreover, while organizing pedagogical interaction, one should remember about the student’s competence, which has to be formed as a result of training. There is an informational environment around the person in the modern world, all his life and professional activities abound with various pieces of information. Thus, the importance of the information competence of a person increases, as well as his ability to process, search, analyze, and synthesize information using different techniques and technologies. A lot of secondary schools begin to teach students to work with information using interdisciplinary teaching tools and e-learning environment [2].

There are many research works devoted to the usage of elements of IEE interactive tools, such as social network [3], student's rating system usage [4], development of interactive learning web-based environments [5], and other learning tools based on Web 2.0 technology [6]. In addition, systematic analyses of e-courses effectiveness [7-8], an assessment of students’ satisfaction with their studies [9] are carried out. Besides, the analysis of using information technologies is made to support this concept [10]. All instruments claimed as tools for organizing and supporting training are located in the IEE.

The organization of pedagogical interaction is used to form professional competence in applied information sciences [11], engineering [12] and chemical [13] fields of study, when training how to use information technologies in the future professional activity of students majoring in Humanities [14].

The aim of this paper is to analyze interactive IEE tools used to create pedagogical interaction for the development of student's information competence.

2 Methods

We consider the information competence to be a set of knowledge, skills and experience in different areas of study when employing information technologies in future professional and educational activities of a student in the context of information interaction and information activities between subjects of the educational process.

Correspondingly, students’ information competence will be defined as the possession of information competences, which enable to implement value and motivational components while doing future professional activities.

Pedagogical interaction is a purposeful interaction between professors / lecturers and students of the University, providing, through mutual influence, quantitative and qualitative changes in the form of improving existing knowledge, skills, and competences and increasing new ones.

The university informational-educational environment is a complex of program, technical, educational, organizational, administrative components of the university system, providing an immediate access to necessary information and organizing subject-subject communication between participants of the educational process.

According to the more precise definition of the IEE, it is necessary to describe the content of complex components. So, the software used for the IEE consists of different platforms to support the educational process. These platforms comprise official and educational sites of the university, LMS (in this paper LMS tools Moodle), tools for indirect pedagogical interaction (e-mail, social networks). Technical tools of the IEE are the equipment of the university (local university networks, servers and computers of the organization). Educational components include educational materials which help to organize the educational process (teaching materials, methodical systems of subject teaching, etc.). Organizational and management components belong to the system of the administrative organization of the IEE and are governed by normative documents of the federal and local levels, namely the Federal Law on Education, state standards of higher education, the Regulation on the Usage of the University IEE, etc. in the Russian Federation.

Interactive tools of the University IEE are a complex of components of the University IEE, providing an immediate access to necessary information, organizing indirect pedagogical interaction of a professor / lecturer and students, as well as actively and diversely reacting to their actions.

Interactive e-learning provides a powerful set of tools to stimulate the educational process, taking into account the needs and the training level of participants of the educational process. The usage of this approach is able to fulfill specific tasks, such as raising students' motivation, supporting with original materials, providing the clarity of basic concepts, increasing the intensity of training, as well as avoiding unnecessary workload.

For the organization of pedagogical interaction different interactive tools within the IEE were used to develop the student's information competence in 2015-2016. We used these tools taking into account the usage of U-learning. Sholom-Aleichem Priamursky State University was an experimentation facility of the research. 76 people took part in the research at its various stages. There were students and members of the faculties of Pedagogics and Psychology - Center for Pedagogical Education, Sociocultural Activity and Service, Mathematics, Information Technologies and Technics, Philology, History and Journalism. E-courses were developed for the subjects engaged in the research. Those e-courses helped to implement methods of pedagogical interaction and support the intramural educational process by tools of several tools available in the Informational-educational environment:

- electronic documentary tools;
- databases and knowledge databases;
- Moodle training management system;
- social networks (communities);
- rating system for recording students' academic achievements;
- free and licensed application software packages.

Electronic and documentary tools are usually included in the IEE as a necessary theoretical basis. Digital libraries, Internet resources for educational purposes, digital educational materials of a lecturer or a professor are often used for this purpose. Their usage is directly related to the knowledge component of the student's competence, his mastering of theoretical positions, technologies, methods, etc.

Databases and knowledge databases are used in two ways:

1. As an electronic resource, its usage is similar to electronic and documentary tools.

2. As an element of preparation, in this case students develop a knowledge database about the principles of an academic discipline, a system of theoretical guidelines. In particular, Wiki-technology, a system of glossaries, etc. are employed.

LMS Moodle is used to fulfill the following functions:

- developments of tasks which give a possibility to send a report in a file format, for example the program code for laboratory works with the attachment of the report;
- a consultation forum for discussing problems that a student can have during his studies, a chat system can also be used for this purpose;
- a forum for carrying out assignments, such as “feedback session”, for example students can evaluate each other's projects and advise how to improve them;
- subject testing system used for intermediate and final testing of students;
- questionnaires and surveys that help to analyse the development of students' competences, which cannot be assessed by academic achievements;
- surveys employed to choose topics for student articles, reports, essays.

Communities of social networks are used to organize group work of students over a given problem under the guidance of a professor / lecturer. The usage of communities is an activating tool that transfers learning into an all-permeating one, due to the usage of mobile applications with the help of which a system with delayed communication can be transferred into an online communication system. The usage of mobile applications to inform about new emails also allows intensifying the support of the educational process.

The main function of the student's rating system is to inform students about the current state of their academic progress. When using this system, the competitive component of the educational process is employed, creating a situation of success or failure for students. These situations motivate them to make additional efforts.

Free and licensed software packages are used as tools for training information technologies. When choosing software, the following factors are taken into account:

1. Software localization should be in Russian, if there is no other way, e.g. absence of analogues, the English version is used.
2. The completeness of the functionality is also taken into account; software should offer all the possibilities that students need to master a subject successfully.
3. Teaching subjects with the help of information technologies has some peculiarities. It is necessary to have educational software on the student's computer. It determines the choice of freeware.

Students should do practical assignments on their own or in groups using computers and the Internet. For the organization of a group interaction of students, there was provided a branch of the forum to share information. Reports on practical assignments were made by each student in the form of an electronic document and uploaded for a professor's review in LMS Moodle. The rating system was used to inform students rapidly about the credits scored. This system is included in the University IEE. For illustrative purposes we will describe several techniques for improving the information competence of a student.

The seminar on the materials of original research works carried out by students under the guidance of a professor. At the beginning of the training, students were given an assignment to make a report on a selected topic. For instance, examples of machine translation systems were offered for students majoring in Linguistics. They made reports on each system and uploaded them with the help of the forum to be discussed by the group. The discussion began after getting an assignment in a month. In the course of the work, the professor assessed the activity of each student, his reaction to the comments of his/her classmates, the level of activity in defending his work, and in studying works of other students.

The system of “feedback session”. A student is given an assignment (making a report, writing an essay, filming a video, etc.). After completing the given assignment the student

uploads it onto a special branch of the forum. His groupmates evaluate this work, pointing at its drawbacks and recommending some improvements. Thus, the student has to defend his work, and then correct it taking into account groupmates' recommendations. The aim of this task is to be able to analyze the works which have some elements of project activities, to take criticism of various kinds, to interact with group members. IEE interactive tools in this case act as a necessary link between the students uploading their works for evaluation and a group of students evaluating these works.

The methods of creating positive competence motivation are employed in organizing and conducting in-person classes such as "dispute seminar", "conference seminar". First of all, students receive a broad topic for their performances. A student has to narrow the topic and choose a subtopic for his performance, to make a report and a presentation and speak at a studying conference.

Methods of organizing interactive cognitive and practical activities of students are arranged in the form of online learning and represent a complex of problematic and research tasks aimed at independent cognitive activity with supervisor's minimal support, which is realized with by tools of organizing indirect pedagogical interaction.

Each student was given an assignment that he was doing during the academic term. While carrying out this task (for example, inventing algorithms for publishing activities), a student could consult a supervisor by tools of a chat once a week. Other types of receiving advice on how to do this assignment were not available to him. The student handed in his work at the appointed time. Then it was checked according to the established criteria.

The assessment of students studying these subjects took place in two stages. The first stage was to test students with the help of LMS Moodle. Each student had an opportunity to be tested on the appointed day and was given one attempt. The second stage was to develop and defend one's own project in a subject. The defense of projects took place during the final class in the classroom.

The monitoring and measuring stage was implemented through the organization of the measurements of the students' information competence. These measurements were carried out for each subject under study during the first and last class.

3 Results and discussion

The main task of studying students' information competence was to observe and record the dynamics of indicators. The object of the research is the process of developing the student information competence, and the subject is the dynamics of changing the level of the student information competence which helps to overcome obstacles in the usage of information technologies.

Table 1. Students' information competence levels

Students' Information Competence Level	Level Characteristics
Low	When a student does an assignment with the help of information technologies, he independently reproduces and uses the algorithms of the learnt basis for carrying out this work
Middle	When the student does an assignment with the help of information technologies, he produces subjectively new information in the course of an independent synthesis of a known basis
High	When the student does an assignment with the help of information technologies, he creates new algorithms for each new situation / task, i.e. objectively new information

Two groups of students were selected for the study. The first control group was trained according to the system of mixed training. LMS Moodle was employed as the site which contained materials and assignments to carry out. The most part of classes was conducted in the classroom. The second experimental group was trained with the help of the pedagogical interaction system. Test measurements showed quantitative changes in the levels of students' information competence in the control and experimental groups.

Table 2. Students' information competence levels dynamics in control group

Groups	Number of students	Students' information competence levels					
		Low		Middle		High	
		No.	%	No.	%	No.	%
Before	69	56	81.2	9	13.0	4	5.8
After	69	43	62.3	19	27.5	7	10.2

Table 3. Students' information competence levels dynamics in experimental group

Groups	Number of students	Students' information competence levels					
		Low		Middle		High	
		No.	%	No.	%	No.	%
Before	66	32	48.5	20	30.3	14	21.2
After	66	13	19.7	24	36.4	29	43.9

The analysis of the research results allows us to speak about the effectiveness of the usage of pedagogical interaction, realized with the help of interactive tools of the informational-educational environment. At the same time, the transition of students from the low level of the information competence to the average level is especially significant. It indicates that there is a shift in the competence, an appearance of a vector for the further development of a student. In addition, the usage of pedagogical interaction has significantly increased the level of the information competence of students who already had prior knowledge.

Quantitative indicators of the dynamics testify the effectiveness of the experimental work, i.e. pedagogical interaction in IEE conditions contributes to the development of the student information competence.

4 Conclusion

The control measurement according to the indicators after the forming experiment showed quantitative changes in the student information competence. The dynamics of these data indicates to the effectiveness of the experimental work. The study shows that pedagogical interaction can be an essential part of the educational process if we change the forms of education. A distinctive feature of pedagogical interaction is the organization of intensive interaction of students with various elements of the IEE. It helps to master students' information competences.

This research does not completely clear up the problem under consideration, offering only one of the variants of its solution. Prospects for further research may be related to the in-depth development of diagnostic techniques and the expansion of pedagogical activity forms in the interaction of the informational-educational environment that forms the information competence of students.

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