



Student Information Competence under Conditions of the Realization of Interactive Pedagogical Interaction

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Abstract

The article analyzes the effectiveness of interactive pedagogical interaction for the formation of student information competence under conditions of informational-educational environment. The concept of information competence and the criteria of student information competence formedness such as intrinsic motivation to use information technologies in professional activities, preparedness to overcome obstacles when employing information technologies, preparedness for proactive work behavior using information technologies, and intellectual activity in working with information technologies are described. Methods of creating positive motivation, methods of organizing student cognitive and practical activities and methods of developing personal educational environment were used in the research. The Pacific National University and Sholom-Aleichem Priamursky State University served as an experimental base. Students and teachers of the Faculty of Psychology and Social-Humanitarian Technologies, of the Natural Sciences Faculty, of the Faculty of Mathematics and Information Technologies, and of the Faculty of Physics and Mathematics took part in the research at different stages. It was determined that the distinctive feature of interactive pedagogical interaction is organizing students' intensive interaction with various elements of informational-educational environment. This interaction results in the students' acquisition of information competencies. The interactive pedagogical interaction in informational-educational environment provides purposefulness, planned character and effectiveness of educational process. The research results demonstrate the effectiveness of pilot-experimental work. The further research may be concerned with an in-depth development of diagnostic techniques and the expansion of the forms of pedagogical activities related to the interactivity of informational-educational environment that forms student information competence.

Keywords: Information competency; Interactive pedagogical interaction; Informational-educational environment

Introduction

Today, the condition of higher education is determined by the necessity to constantly modify educational process. The main purpose of this modification is to ensure preparation of qualified professionals under conditions of changing requirements. In addition, in higher education the role of using software and technical aids for information processing as a means for efficient professional activities is increasing. Therefore, in the process of reforming higher education, one of the goals of higher education is to develop student information competence. At the same time, in studying disciplines concerned with employing information technologies in student professional activities, a great number of exercises for reproduction and performance according to a pattern are used.

In addition, theoretical research and statistical data show the diversity of the student body under modern conditions. In this connection it is relevant to consider the levels of the development of information competence. These levels are to show what method the student uses in order to realize the information competence in his/her future professional work. Modern practical activities require that the student develop information competence on a high level. One of the important factors may be the employment of interactive pedagogical interaction in order to form student information competence.

P.S. Pottinger was one of the first to show ways of identifying and measuring competencies. He suggested that the ability to work competently is the determining factor in licensing and certification of professionals when the assessment and evaluation of professional performance outcomes should be made [1].

In the 90s of the 20th century various types of assessment and evaluation of competencies became widespread: authentic assessment, evaluation of effectiveness, dynamic assessment, evaluation of alternatives [2-5].

Competence, according to R. Trincherio, is not just a set of skills and knowledge, but it is a process in which the subject activates resources. The author emphasizes that the assessment of competency should be focused on the technique [6].

Analysis of contributions on the use of interactive communication means in learning shows that various methods of application of this process have a positive impact on student competence. For example, the research by Y. Al-Ashmoery, R. Messoussi, S. Mazaheri and O. Fatemi shows the effectiveness of using interactive forms of communication in real time for developing competence in Data Mining with the help of learning analytics systems. And, as shown by A. Horvat, K. Touya and M. Fakir, students generally have a positive attitude to these innovations in the educational process [7-10].

In addition, in today's higher education it is possible to use distance education technologies to support full-time study [11,12]. Research using methods, confirms that these technologies can effectively support educational process, turning it into a blended learning. Also, researches show monitoring effectiveness of students' self-study [13-19]. Moreover, all the processes that occur during the use of distance education technologies affect to one degree or another informational-educational environment of the educational organization. Analysis of the factors influencing the performance of the information environment, using Moodle learning management system, was made by V. Damnjanovic [20].

Method

By information competency, we will mean a body of knowledge, skills and experience in the subject area when information technology capabilities are realized in the student future professional and educational activities under conditions of informational interaction and information activities between the actors of the educational process.

We will accordingly define student information competence as possessing information competencies ensuring realization of value and motivation components in future professional activities.

Interactive pedagogical interaction is a process of direct and indirect teacher–student interaction during which information is exchanged, which facilitates the formation of student competencies.

Analysis of the normative documents of higher education allows us to define the basic information competencies that are directly related to the employment of information technologies in professional activities. These are the following: ability to apply the main methods, ways and means of getting, storing and processing of information, and use the computer as a tool for managing information, including information in global networks; ability to apply modern education and information technologies for improving one's professional qualifications of general culture, and independently search for professional information in printed and electronic sources,

including electronic databases; ability to generalize, analyze, think critically, systematize information, predict, set professional goals and choose ways of achieving them, and analyze the logic of reasoning and statements. This analysis also allows us to identify four criteria of the formedness of student's information competence.

The intrinsic motivation to use information technologies in professional activities is seen as the student's awareness of the necessity to use information technologies in his/her activities, and his/her striving for self-development and improvement of qualification and mastery. He/she exhibits creative qualities, sets goals correctly, achieves them persistently and sturdily. A student possessing intrinsic motivation to use information technologies understands the social significance of his/her future profession and has strong motivation for professional activities.

Preparedness to overcome obstacles when using information technologies is regarded as student preparedness to continue working with information technologies after failures in this work, as well as to develop ways of preventing difficulties in his/her activities. This preparedness can be defined as an ability to critically evaluate one's own strengths and weaknesses, to choose ways and means for developing the former and removing the latter, preparedness to be responsible for the outcomes of his/her professional activities, as well as to take care of the quality of the work performed.

Preparedness for proactive work behavior using information technologies is viewed as diligence combined with the student's initiative when using information technologies. It is realized through the ability to take organizational and administrative decisions in nonstandard situations, to use basic knowledge and skills of information management for solving research problems, to take prompt decisions in crisis situations, to develop innovative solutions, as well as to work independently with different information sources.

Intellectual activity during working with information technologies is regarded as the need to use information technologies in one's work at the level of utilizing information technologies and creativity. It implies having basic skills to collect and analyze information by means of information technologies; ability to conduct supervised local research on the basis of the existing techniques; preparedness to use basic methods, ways and tools for obtaining, storing and processing of information; preparedness to work with the computer as a tool for managing information. Intellectual activity in working with information technologies is also reflected in the ability to work with information technologies in global computer networks; in the acquisition of new knowledge and the formation of opinions on various issues, using modern information technologies; in the command of the standards of thinking; and in the ability to synthesize, analyze and take in information.

To create interactive pedagogical interaction for the purpose of forming student information competence, in 2014-2015, organizational forms of blended education based on the elements of distance education technologies realized with the

help of Moodle learning management system were used. The Pacific National University and Sholem-Aleichem Priamursky State University served as an experimental base. Students and teachers of the Faculty of Psychology and Social-Humanitarian Technologies, of the Natural Sciences Faculty, of the Faculty of Mathematics and Information Technologies, and of the Physics and Mathematics Faculty took part in the research at different stages – 92 participants all in all. For the disciplines under study, e-learning courses had been developed which realized the methods of interactive pedagogical interaction and supported fulltime education process.

This work aims at the analysis of the effectiveness of using interactive pedagogical interaction under conditions of informational-educational environment for developing student information competence.

The teacher's activities for creating an electronic course consisted in developing electronic versions of materials adapted for their use by means of distance learning technologies. These materials had been completed before the actual process of issuing the e-learning course in the Moodle learning management system. Each discipline involves different types of classes, but there are invariant types of materials required for the e-learning course content:

Theoretical material on the discipline: lecture notes in an electronic form, a textbook, a list of recommended reading on the discipline, etc.

Practical assignments on the discipline: collection of practical and laboratory work, seminars, etc.

Diagnostic unit of the discipline: assignments for independent work, topics of control works, test assignments, project activities, a bank of test assignments (a minimum of 40 questions with key answers), etc.

Methods unit of the discipline: instructions for working with the above materials.

All the materials were placed in moodle.pgusa.ru; in addition, a chat and a forum were set up for consultations and teacher-student interaction. During the education process the teacher's work consisted of checking and assessing practical assignments completed by the students, working with them through a chat and forums, as well as through other forms of interaction.

In creating e-course it became necessary to use the software which was not available in the educational institution. This problem was solved by finding free training or demonstration versions of these products and placing links to them in the respective papers. For group work, a system of groups that is part of the Moodle learning management system was employed.

Student activities in the interactive pedagogical interaction consisted of independent or group completion of practical assignments with the assistance of a computer and the Internet. To arrange group interaction, the students were provided with a forum thread where they could share information. Reports on the practical assignments completion

were issued by the student as an e-document (in Word) and loaded in the Moodle for the teacher's evaluation.

In order to form information competence when studying a discipline, the student was offered productive and creative types of assignments. These assignments were obligatory and were not assessed by premium scores. For these assignments the student was given the work objective, the supposed form of reporting and the assessment criteria.

The controlling procedure in these disciplines was carried on in two stages. At the first stage the students were tested distantly by means of the Moodle learning management system. Testing was possible on a fixed date, and every student was allowed to make one attempt. At the second stage the student was to develop and present a project on the discipline. The presentation of projects was held during the arranged controlling procedure in the classroom.

Experience shows that the Moodle learning management system, with interactive pedagogical interaction employed, influences essentially other elements of the teacher's organizational-methodological activities aimed at forming student information competence, giving the students an opportunity of network interaction with one another and with the teacher.

When a blended form of training was used, lectures, practical and laboratory classes were conducted, taking into account their specific features. As to the distance part of the lecture course, the students studied it on their own; the teacher's task was to prepare material for the study. Different kinds of lecture materials were used. Thus, when making a list of recommended literature, it was necessary to ensure that the student can get access to this source, so the supposed location of receipt (the university library, electronic link, or others) was indicated. In addition, audio and video materials were added, if any, located on third-party sites, e.g. You Tube, or in the system, not more than 8 MB.

The passing of a lecture course was confirmed by one or several control points. These points were the following: assignments to make notes on the lecture topics, tests on a certain topic or a group of topics, communications (a review, an essay) on a topic from the offered list, etc. For any kind of control, recommendations on the completion of an assignment and the form of the report, and criteria for the assessment of the work were described.

To conduct distance seminars, assignments for writing a brief answer in an electronic form to each of the seminar questions were mainly used. One of the conditions in the work assessment criteria was that the student should create tables, diagrams and charts, basing on the analyzed information, which ensures a more careful preparation. In addition, programs for checking the work for originality were used.

A distance laboratory work was a clearly presented system consisting of general statements concerning the work, brief theoretical material, assignments with the work fulfillment algorithm, questions for the summary and analysis of the results and recommendations on the form of the report

presentation. In creating laboratory works for distance learning, assessment criteria for each work, as well as the form of its submission to the teacher were defined.

In addition, within the framework of each discipline during the semester, students worked at a project. They either wrote an essay on a topic developed by the teacher, or did a group project on the discipline, or wrote a scientific paper/article and published it, etc. Ways of presenting the work were developed, e.g. a presentation with the inserted sound track that has the accompanying text on it.

Textbooks and manuals having the format of a printed and digital text were selected, as well as sites relevant to the modules of a discipline. From the promising learning tools, the Moodle learning management system was chosen, and the methods for using it to realize interactive pedagogical interaction were developed for the purpose of forming student information competence.

The method of a meta-disciplinary approach was applied in organizing the work of full-time students. It implies their work with sets of lectures, seminars / practical classes and individual assignments.

A set of lectures contains a table of contents and lecture notes. Each lecture plan includes the topic, objectives, a review of educational elements, a glossary, topics of seminars and independent assignments.

A set of seminars contains plans of seminar classes and notes on their issues. Each plan includes the topic and purpose of the seminar, basic concepts on the topic, a list of recommended literature; questions for the quiz; learner's guide on the topic of the class.

A set of individual assignments contains individual assignments indicating the text of the assignment, solution with a detailed answer, and ascertaining and interpretation of the answer.

The blended learning methods are used in the present research as a combination of traditional teaching methods (explanation, illustration, problem, research and partial search methods) and the methods of using blended learning tools on the basis of the Moodle learning management system: use of a module approach of an e-learning course in lectures and seminars; application of the elements of the courses, 'Linking to a File or a Web-page' and 'An Answer in the Form of Multiple Files'; online communication via Skype; individual projects; course materials (textbooks and manuals); organization of student individual achievement monitoring with the help of the course element, 'Assessment'.

The use of the methods of individualized instruction was based on the necessity of individual assignments for the formation of student information competence; for management purposes, periodic monitoring of the quality of mastering was selected. To this end, individual assignments for each topic of the discipline were developed, tested and applied.

We will show the use of interactive pedagogical interaction under conditions of informational-educational environment by several examples. During training, students were asked to write an essay, with all the activities organized in the Moodle learning management system. At first the students were to choose from a list of essay topics, organized with the help of the Moodle element, Quiz. A file was attached to the assignment with instructions on the presentation form of the essay and the criteria of its assessment. The criteria included the following:

Presentation of one's own point of view;

Elaboration on the issue at a theoretical level (the use of terminology, familiarity with the sources, ability to creatively use various sources and to refer to them);

Content and quality of the argumentation;

Style and internal organization (clarity, order, coherence and presentation logic are assessed);

Presentation of the essay (the form of the presentation).

It was suggested that the completed assignment should be presented in one of two forms: either as a recorded video of the essay presentation, or its presentation with the attached audio. Based on the essay assessment criteria, the student was given points according to the assessment system presented on the page of the course. During the whole learning period students communicated with the teacher via the elements of the Moodle learning management system: a forum, messaging, a consulting chat; as well as using Skype software and e-mail.

Another example of employing interactive pedagogical interaction is a seminar on the records of particular research conducted by students under the supervision of the teacher. At the beginning of learning, students received an assignment to prepare a contribution. For instance, in Linguistics, examples of machine translation systems were given. On each of those, they prepared contributions which they posted at a forum for the discussion by the group. The discussion began a month after the assignment had been given. During the work the teacher assessed each student's activities, their reaction to the group mates' remarks, their activeness in presenting their work, as well as in studying the other students' works.

One more example of the implementation of interactive pedagogical interaction is application of the debriefing system. This method means the following: a student is given an assignment (a review, an essay, a video, etc.); having completed it, he/she posts the work in a special thread of a forum. Other students evaluate the work, pointing to its shortcomings and recommending making some corrections. Thus, the student is to present his/her work, then to correct it in accordance with the critical remarks. The essence of this assignment is analysis of the work that realizes some project activity, adaptation to various kinds of criticism and interaction among the participants of the learning group. In this case, the teacher as a participant of the interactive pedagogical interaction is a necessary link between the student posting his

contribution for evaluating and the student group evaluating this work.

The final example of applying interactive pedagogical interaction is the student's completion of an individual interactive assignment. Each student was given an assignment that he/she completed during the semester. In this work (e.g. algorithm of publishing) he/she could consult the teacher via a chat once a week. Other kinds of consultations on this assignment were not accessible for him/her. On a fixed date the student submitted his/her work and it was assessed according to the established criteria.

Results and Discussion

The purpose of the study of the formedness of student information competence on the basis of informational-educational environment was to observe and record the dynamics of indicators. The object of monitoring is the process of the formation of student information competence, and the subject, the dynamics of indicator elements of the formation of student information competence under conditions of interactive pedagogical interaction.

Test measurements were carried out in 2014-2015: until the formative experiment, during the first classroom lesson and after the formative experiment, within the framework of the final classroom lesson. These measurements show quantitative changes in the indicators of student information competence (Tables 1-4). The criterion, 'Student intellectual activity in working with information technologies', was assessed with the help of the developed system of assignments; the student's level by this criterion is determined by the level of assignments which he/she is able to solve; the criteria, 'Intrinsic motivation for using information technologies', 'Preparedness for overcoming obstacles in using information technologies', and 'Preparedness for proactive work behavior using information technologies' were assessed by means of the developed tests. For each criterion, levels of formedness were assessed: low, medium and high. The formedness of a criterion in the above methods of assessment is determined by the student's transition to a high level (Tables 1-4).

Table 1: Dynamics of the levels of student intrinsic motivation for using information technologies.

Stages	Number of students	Levels of student intrinsic motivation for using information technologies					
		Low		Medium		High	
		Number	%	Number	%	Number	%
Before the experiment	92	58	63.0	24	26.1	10	10.9
After the experiment	92	42	45.7	28	30.4	22	23.9

Table 2: Dynamics of the levels of student's intellectual activity in working with information technologies.

Stages	Number of students	Levels of the student intellectual activity in working with information technologies					
		Low		Medium		High	
		Number	%	Number	%	Number	%
Before the experiment	92	56	60.9	30	32.6	6	6.5
After the experiment	92	28	30.4	36	39.1	28	30.4

Table 3: Dynamics of preparedness for proactive work behavior using information technology.

Stages	Number of students	Levels of preparedness for proactive work behavior using information technologies					
		Low		Medium		High	
		Number	%	Number	%	Number	%
Before the experiment	92	56	60.9	24	26.1	12	13.0
After the experiment	92	28	30.4	32	34.8	32	34.8

Table 4: Dynamics of the preparedness for overcoming obstacles in using information technologies.

Stages	Number of students	Levels of the preparedness for overcoming obstacles in using information technologies					
		Low		Medium		High	
		Number	%	Number	%	Number	%
Before the experiment	92	54	58.7	34	37.0	4	4.3
After the experiment	92	42	45.7	28	30.4	22	23.9

As a result of employing interactive pedagogical interaction the level of formedness of student information competence has essentially increased. Thus the formedness of student intrinsic motivation for using information technologies has changed from 10.9% to 23.9%. This dynamics demonstrates students' increased desire to find personal motives for the successful fulfillment of work with the help of information technologies.

The experiment on determining the dynamics of the level of intellectual activity in working with information technologies has led to a considerable reduction of the low level (Table 2); thus the number of students with low level has reduced by 30.5%. Accordingly, the number of medium level students has decreased by 6.5%; this indicator confirms a considerable increase of the number of high level students: 23.9%. The obtained results concerning intellectual activity in working with information technologies allow us to speak about the effectiveness of this approach for the formation of student information competence.

In addition, the formedness of students' preparedness for proactive work behavior using information technologies has grown from 13% to 34.8% (Table 3). This change is very important from the viewpoint of students' future professional activities; it shows that their ability of self-development and self-education has increased.

Student preparedness for overcoming obstacles in using information technologies has changed from 4.3% to 23.9% (Table 4). This change demonstrates that the applied methods are effective for the development of this criterion of the formedness of student information competence.

The quantitative indicators in dynamics confirm the effectiveness of the pilot-experimental work: interactive pedagogical interactions under conditions of informational-educational environment facilitate the formation of student information competence.

Conclusion

Control measurements according to the indicators after the formative experiment have demonstrated quantitative changes for a number of indicator elements of student information competence. The dynamics of these data confirms the effectiveness of experimental work:

1. The research has revealed that building interactive pedagogical interaction for the formation of student information competence does not require the creation of principally new external organizational forms, fitting in with the existing practice of the administrative organization of the

learning process; however, it considerably modernizes the internal forms of teaching and learning. A distinctive feature of interactive pedagogical interaction is the creation of students' intensive interaction with various elements of informational-educational environment, leading to students' mastering of information competencies.

2. In order to achieve the aims of using interactive pedagogical interaction in forming student information competence, methods of creating positive motivation, of organizing student interactive cognitive and practical activities, and of developing personal education environment are used.

3. The employment of interactive pedagogical interaction under conditions of informational-educational environment provides purposefulness, planned character and effectiveness of the education process.

The research presented in this article does not cover the whole scale of the issue under consideration, offering only one of the variants for its solution. The further research may be associated with the in-depth development of diagnostic techniques and the expansion of the forms of pedagogical activities related to the interactivity of informational-educational environment forming student information competence.

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