INTERDISCIPLINARY INTEGRATION AT THE UNIVERSITY: DEVELOPMENT OF A NEW DISCIPLINE

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Abstract

In the process of digitalization of the university educational environment, the problem of training graduates with interdisciplinary knowledge in the field of foreign languages and digital technologies is becoming more urgent for their future successful professional activity. The identified problem determines the purpose of the study, which is to reveal the level of students` motivation to study the integrative course "English language and ICT in professional activities". To obtain objective, evidence-based data and to identify the level of elaboration of a scientific problem, such theoretical and empirical research methods as summarizing, analyzing pedagogical scientific literature and pedagogical experience, as well as a questionnaire survey were used. As a result of the study empirical data from testing of 127 students of Kazan Federal University which indicate a high level of students' motivation to use an interdisciplinary approach in learning English and digital technologies were obtained; the analysis of the results was presented; the concept, the essence and interdisciplinary integration structure were considered. The materials of the article may be useful for researchers in the field of pedagogy.

Keywords: higher education, interdisciplinary integration, English language, information and communication technology.

1 INTRODUCTION

Modern pedagogical science puts forward interdisciplinary integration as a necessary process in education and one of the most important methodological foundations. The emergence of a large number of new academic disciplines makes it necessary for students to assimilate disparate knowledge, apply them theoretically and in practice in a complex [1]. Scientists point to the growing relevance of interdisciplinary integration in the context of a competency-based approach in education and attribute this to the fact that a modern graduate is a specialist who not only analyzes effectively, designs, chooses the best ways to solve professional problems, but also possesses communication technologies, sets and solves tasks in various situations [2]. It should be noted that interdisciplinary approach is not a new phenomenon in pedagogy. It arose in the process of realizing that overloading students with disparate educational information develops mainly their memory, not thinking and personality [3].

Interdisciplinary integration is of particular importance in connection with the processes of digitalization of higher education. The training of bachelors requires, on the one hand, a high level of competence for the successful professional activity; on the other hand, the graduate must be proficient in digital technologies. Analysis of studies, scientific and pedagogical literature revealed a contradiction between the need of labor market for competent graduates, and the existing level of English language knowledge and digital competence of bachelors, which is insufficient for their future successful professional activity [4; 5]. The revealed contradiction actualizes the research problem: is it possible to use interdisciplinary integration at the university effectively to increase the level of bachelors' knowledge of foreign languages and digital technologies. The identified problem determines the purpose of the study, which is to consider the resources of interdisciplinary integration for the successful design, organization and implementation of the integrative course "English Language and information and communication technologies (ICT) in Professional Activities" at the university in the process of bachelors training.

2 METHODOLOGY

In the process of the study, systemic approach was used to perform a comprehensive analysis of the pedagogical phenomenon, considering its essence and component structure. To obtain objective data, as well as to identify the level of elaboration of a scientific problem, theoretical methods of studying, generalizing, analyzing pedagogical scientific literature and pedagogical experience were used. The methods of a questionnaire survey and testing made it possible to collect empirical data for assessing the students` motivation to study an integrative course for bachelors «English language and ICT in professional activities» and its effectiveness at the first stage of pedagogical research.

3 RESULTS

The objectives of this study determined the need to review scientific works in the field of interdisciplinary integration at the university and reveal the definition of the concept under study, its essence and structure. Next, the steps to design interdisciplinary training course for bachelors are considered. The study presents the results of a questionnaire survey and testing of students.

3.1 Literature review: Concept Definition

The attention of scientists is attracted to the study of various aspects of interdisciplinary integration in higher education. Interdisciplinary integration is studied as a principle of learning integration [6], the pedagogical phenomenon is considered as a methodological basis of the modern educational process [7], as a requirement for improving the quality of students` professional training [8], as a requirement for the formation of students` pedagogical competence at the music university [9]. The attention of researchers is also focused on the study of interdisciplinary integration in studying web technologies and computer graphics and in the economic sphere of undergraduate education [2; 10]. In addition, scientists analyse the implementation of interdisciplinary integration in the educational process of future teachers training [4]. Of particular interest for our study is the work by T.E. Pakhomova on the formation of ICT competence of students of a pedagogical college, considering interdisciplinary integration in the context of digitalization of education [5]. The study of scientific works has shown the insufficiency of research on the problem of interdisciplinary integration in higher education in the context of the digitalization of education, which actualizes a deeper consideration of the pedagogical phenomenon.

Currently, scientists, studying various aspects of interdisciplinary integration, use definitions that indicate the mandatory use of integrated classes, during which interdisciplinary connections are made on the one hand and the integrity of basic academic disciplines is maintained on the other [11; 12]. In the researchers` works, the role of interdisciplinary integration in the development of a harmonious personality, intellectual and creative abilities of future specialists and the formation of their professional competence are emphasized [1]. According to E.A. Bushkov's integration is an important principle in the development of modern education. The scientist points out that interdisciplinary integration involves the development of the discipline content on the basis of global, fundamental themes [3]. Interesting for our study is the approach of L.V. Lvov, who uses the level approach when considering interdisciplinary integration. The scientist explores interdisciplinary integration at the methodological level as an approach to the problem, at the theoretical level as a possible pedagogical requirement and at the practical level as a form of learning organization. At the same time, the scientist differentiates the concept of interdisciplinary connections, linking this process with the coordination and combination of disciplines while maintaining the content and functional independence of each. With interdisciplinary integration, the content of disciplines interpenetrates, leading to the emergence of a qualitatively new educational unit [13].

The analysis of the definitions of interdisciplinary integration proposed by scientists and our own research allow us to conclude that interdisciplinary integration at the university is a complex, systemic and multi-level phenomenon that involves the use of integrated classes, the content of which is a new discipline developed in the process of synergy of fundamental topics, and the result – new competencies of students.

3.2 Essence and Structure of Interdisciplinary Integration

The analysis of modern studies of interdisciplinary integration has shown that scientists consider the essence of this pedagogical phenomenon based on the educational goal, which involves the development of students' motivation for learning and creativity, preparing a graduate for systemic humanitarian thinking and a high level of research competence [12]. At the same time, scientists note that interdisciplinary integration in higher education should not only design academic disciplines in blocks, complexes or modules, but coordinate all components of the educational process, including goals, results, content, forms and methods of teaching and should be characterized by the connection of academic disciplines with professional activities of future specialists [8].

Pedagogical research points to the differentiated nature of various complementary types of integration - horizontal and vertical. Thus, horizontal integration involves the study of problems or the solution of practical problems of two or three disciplines within one, and vertical integration, supplementing the horizontal one, includes scientific and applied problems in the content of integrable disciplines and thus solves interdisciplinary problems [8]. The essence of interdisciplinary integration is reflected in the system structure of this complex pedagogical phenomenon. L.V. Lvov in his work points out the

existence of three levels. The transition to each next level is carried out only as the effectiveness of the previous level decreases [13].

At the first level, interdisciplinary connections are developed, the terms and sequence of curricula of integrated disciplines are coordinated, the content is designed and streamlined, taking into account the formation of a single terminological and conceptual apparatus. The teaching activity of the teacher and the educational work of students are aimed at ensuring that the competencies acquired in the study of an integrated discipline can be applied in other disciplines.

The second level of interdisciplinary integration involves the development of formed competencies and includes the process of combining, merging and interpenetrating the content of integrated disciplines to improve the educational level and ability to perform professional activities effectively.

In order to achieve educational and professional competence, according to the scientist, a transition to the next level of interdisciplinary integration is necessary, which implies complete interdisciplinary integration in terms of the content and methods of educational and professional activity. Knowledge acquired in the study of special disciplines should be transformed into professional competence [13].

Scientists believe that for students, participation in an interdisciplinary project should result in the achievement of the learning goals. Students should have interdisciplinary skills, that is, know and understand the problem from the point of view of different disciplines; be able to evaluate knowledge in a wide range of disciplines critically; have the ability to participate in interdisciplinary research and solve problems using various ways of learning; have an interdisciplinary understanding of the nature of knowledge; be able to integrate, synthesize, balance and adapt knowledge from several disciplines in order to produce something more than would be possible from the point of view of any one discipline; have the skills to apply the acquired knowledge in practice [14].

3.3 Interdisciplinary Course Development

When developing a new integrative discipline «English language and ICT in professional activities» at the first stage of the pedagogical experiment, it was necessary to develop a curriculum of an integrated discipline. It included a pedagogical forecast of the expected results of students` knowledge, skills and abilities; pedagogical tools to determine criteria, indicators and evaluation levels of students` educational activity. It is recomended to consider each of the listed stages in the process of developing, organizing and implementing an integration project. Omitting any of the stages may decrease the effectiveness of the training activity.

The 2022 Curriculum of the educational institution included elective disciplines: "Computer Science" and an integrative course "English language and ICT in professional activity". At the first meeting with students, a motivational interview was conducted about the prospects of learning English and ICT using an integrative course, which was attended by students of two groups (46 students) of the first year. According to the results of the interview, 24 students chose the integrative course "English language and ICT in professional activity", and 22 students chose the discipline "Computer Science".

The purpose of the discipline "English language and ICT in professional activity" is to increase the bachelors` level of English language and ICT competence. The discipline includes 3 credits – 108 teaching hours. Classroom work of teachers with students – 72 hours, including lectures – 24 hours, practical classes – 48 hours. Independent students` work – 36 hours. The form of intermediate control of the discipline: a credit in the second semester. The form of the final control of the discipline: the exam in the third semester.

As a credit assignment, students take the discipline test. The test includes 100 questions, respectively, 25 questions for assessing knowledge in English, Computer Science, Etiquette of Networking, ICT technologies in professional activities. The examination task includes the presentation of a creative educational project using ICT – "Digital technology in professional activity". The educational process is carried out remotely using the TEAMS communication portal and an electronic educational resource on the discipline. In the classroom and when doing homework, bachelors use educational Internet resources on YouTube, demonstration capabilities of Prezi, ClearSlide, VoiceThread, TopHat, PosterMyWall and PowerPoint to create electronic presentations, tools for creating graphics: Canva, PosterMyWall, Piktochart, GesidnCap, Visme, Storybird, tools for editing and processing videos and creating video tasks: Movavi, Cantazia, oCam Screen Recorder, iMovie, Flipgrid, Thingling, students used the Vimeo platform to demonstrate the recording of the training stage of the remote lesson project. Students also use free access to such library resources as: Electronic library system "Znanium", Electronic Library (IC Academy), Electronic library system "STUDENT CONSULTANT", Electronic

library system "LAN" and others. In the process of developing an integrative course, it was considered to be important that students know what integrative activity they were participating in, what interdisciplinary skills they needed and how they should apply them and what was considered high quality interdisciplinary work.

An important issue for discussion in this study is the quality of interdisciplinary discipline. When assessing the quality of an interdisciplinary subject, we considered three components - the content of the curriculum, student learning outcomes, and the work of teachers.

When diagnosing the content of the curriculum, we evaluated how much it represented a variety of approaches and ways of knowing; if it was based on a strong link between learning, research and practice; if it had clear and explicit interdisciplinary expectations and goals; if it gave students a clear understanding of what interdisciplinary research was; if it revealed the interdisciplinary activity necessary for the synthesis of different points of view; if it contained assessment tasks reflecting interdisciplinary goals and objectives.

In the process of diagnosing the students` learning activity in an integrative course, the teacher evaluated the students` team work; comprehensibility of discipline for students; level and quality of acquired knowledge; the ability of students to generalize and evaluate knowledge from a wide range of disciplines critically; students' awareness of the relativity of knowledge across the discipline and the value of applying different approaches in the field of study.

An important role in assessing the ability of the teaching staff to use an integrative approach is played by motivation and sufficient pedagogical experience for teaching interdisciplinary content.

3.4 Questionnaire Survey and Testing

Scientists believe that the questionnaire survey is designed to maximize the understanding of how an integrative discipline allows students to think in a new way; demonstrates to students' new views and ways of knowing; improves understanding of what interdisciplinary research is and how to conduct it. The use of questionnaires, both during classes and as homework, allows students to avoid misconceptions about interdisciplinary teaching and learning in a timely manner, compare and discuss what students have learned and where they have achieved a deeper understanding [14].

In the course of the research, in order to assess the students` motivation to study the integrative course "English language and ICT in professional activities", a questionnaire method was used. 127 students of Kazan Federal University took part in the questionnaire survey. The developed questionnaire included questions of closed and open type. The results of the survey contributed to the formation of experimental and control groups of students, depending on the identified level of motivation to study a new discipline using interdisciplinary integration.

The questionnaire included the following questions:

1 Do you think that the integration of the disciplines "English language" and "ICT in professional activities" will increase the level of knowledge in both areas of knowledge? If the answer is “yes”, then rate how interdisciplinary integration affects the increase in the level of knowledge on a five-point scale.

2 Does interdisciplinary integration improve interaction between teachers and students? If the answer is “yes”, then rate the impact on a five-point scale.

3 Does disciplinary integration create a more favourable environment for learning the discipline? If the answer is “yes”, then rate the educational environment in the process of studying the integrative course on a five-point scale.

4 What pedagogical technologies can increase the effectiveness of disciplinary integration in the digital educational environment at the university? Rate the technologies proposed in the answers on a five-point scale. You can add your own answers.

5 Would you like to learn English language and ICT as an integrative course?

The survey results revealed that:

81 (64%) of the students surveyed believe that the interdisciplinary integration of the disciplines "Foreign language" and "ICT in professional activities" will increase the level of knowledge in both areas of knowledge to a large extent, 40 (31%) - can influence; 6 (5%) - practically no effect);

73 (58%) of the students surveyed believe that interdisciplinary integration significantly affects the level of interaction between teachers and students, 46 (36%) can influence; 8 (6%) - practically no effect);

87 (69%) respondents believe that interdisciplinary integration creates a more favourable environment for conducting classes, according to students, 36 (28%) - not always, 4 (3%) - causes difficulties)

61 (48%) of the respondents indicated that digital pedagogical technologies and case studies will improve disciplinary integration in the digital educational environment of the university, 44 (35%) - chose project technologies, 22 (17%) - consider gaming technologies and teamwork technologies to be the most effective).

83 (66%) respondents indicated that they would like to study a foreign language and ICT using an integrative course, 36 (28%) would probably think about it; 8 (6%) do not consider it necessary).

The results of scaled responses showed the quantity of students with low, middle and high motivation level to study the course using interdisciplinary integration at the first stage of pedagogical research. This indicates the need to continue pedagogical work aimed at making students aware of the effectiveness of interdisciplinary integration. The results of processing students' answers are demonstrated in Table 1.

Table 1. The level of students` motivation for learning English and ICT using an integrative discipline

number of students	***Low level 56 - 70 points***	***Middle level 71 - 85 points***	***High level 86 - 100 points***
	number of students / %	number of students / %	number of students / %
127	24 / 19%	91 / 72%	12 / 9%

To obtain empirical data on the effectiveness of studying an integrative course at the first stage of the pedagogical experiment, the method of comparing test results was used. The level of experimental group students' knowledge in the integrated discipline "English language and ICT in professional activities" was assessed. The students of the control group were tested in the disciplines they studied: "English language" and "Computer Science". The test included 100 tasks of various types: multiple choice tasks, open type tasks, and tasks with the opportunity to supplement the proposed answer. The maximum rating of correct answers in accordance with the accepted scale was 100 points. The test contained 25 tasks each to assess knowledge in English, Computer Science, Etiquette of Networking, ICT technologies in professional activities. The analysis of the test results showed that at this stage of the pedagogical research, the students of the experimental and control groups showed comparable data. None of the students surveyed (46 people) scored the maximum number of points (100 points), 5 students (11%) scored 56 - 70 points, 32 students (70%) - 71 - 85 points and 9 students (19%) scored 86 - 90 points. A comparative analysis of the results of test participants in the experimental and control groups is shown in Table 2.

Table 2. Level of students` knowledge in English and ICT

Group / number of students	***Low level 56 - 70 points***	***Middle level 71 - 85 points***	***High level 86 - 100 points***
	number of students / %	number of students / %	number of students / %
Experimental group / 24 students	2 / 8.3%	17 / 70.8%	5 / 20.8%
Control group / 22 students	3 / 13.6%	15 / 68.2%	4 / 18.2%

In order to confirm the reliability of the results obtained, the nonparametric Mann-Whitney U-test was used, which is a statistical method for assessing the differences between two independent samples by the level of a quantitative trait. The U-criterion is suitable for comparing small samples. The Mann-Whitney U-test made it possible to assess the insignificance of differences in the levels of knowledge of the assessed disciplines in the control and experimental groups at the first stage of the pedagogical experiment.

The study of interdisciplinary integration as a pedagogical phenomenon allows us to formulate step-by-step requirements for its effective implementation in the educational process at the university. First, we establish the need for interdisciplinary integration, as well as the expected results. Secondly, we define the integrable disciplines, identifying the core that unites them; choose necessary functions, levels, form,

type and type of integration. Thirdly, it is important to substantiate effective methods of interdisciplinary integration, considering the specifics of the educational material and digital educational environment. And finally, we determine the requirements for introducing learning outcomes into professional practice through project activities using digital technologies. Thus, for the effective implementation of interdisciplinary integration at the university, it is necessary to use integrative pedagogical technologies and forms; develop digital competencies of teachers and students; create and implement curriculum with interdisciplinary forms of training and competency control.

4 CONCLUSIONS

The study allows us to draw the following conclusions:

1 Empirical data obtained as a result of a questionnaire survey of students indicates that 64% of the students surveyed believe that the interdisciplinary approach will increase the level of knowledge in "Foreign language" and "ICT in professional activities" to a large extent and 66% of respondents would like to study a foreign language and ICT using an integrative course.

2 The development of an integrative course “English language and ICT in professional activity" at the university can be defined as a step-by-step organizational process and the result of pedagogical training activities aimed at obtaining new language and ICT competencies not inherent in the integrated disciplines before;

3 It is necessary to continue pedagogical research to identify the requirements for the effective implementation of the interdisciplinary course “English language and ICT in professional activity" in the educational practice of the university.

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