§4.2 STUDENTS' KNOWLEDGE CONSTRUCTION AS A NECESSARY SKILL OF THE 21st CENTURY IN THE CONTEXT OF PROFESSIONAL-ORIENTED FOREIGN LANGUAGE

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Introduction. Preparing future specialists for employment in the society of the 21st century, educators consider the features of the future working environment of the specialist and its characteristics. A characteristic feature of the modern world is its constant changes and rapid development that affect the educational process. The educational environment of the 21st century adapts and changes simultaneously with the processes in the entire society. Modern qualitative education considering the trends of the modern world, involves innovative teaching and innovative learning, which includes a high level of student involvement in the formation and organization of the educational process, the development of competencies necessary for successful employment, and skills that would contribute to a successful career in modern society.

Discussing the problem of innovative teaching and learning, educators and scientists see the need for an educational process that is based on cooperation, has a practical orientation and various types of educational activities. At the current stage of the society development in general and education in particular, the restructuring of the educational process is being considered with the aim of developing the skills of the 21st century. Cooperation, effective communication, self-regulation and evaluation, real-world problem solving and innovation, using information and communication technologies in the educational process, and knowledge construction are among the skills that will be necessary for future specialists of the 21st century.

Today's globally connected world is characterized by instant access to information. Knowledge construction in the modern educational environment implies involvement in learning through analysis, synthesis, evaluation, comparison of this information in order to construct understanding, i.e., the combination of these ideas [1]. The goal of the educational process is the development of skills that are essential for effective knowledge construction. In this context, the activity of an educator changes from the transfer of the knowledge content to its joint construction [1].

The very concept of knowledge construction is considered by experts as:

• a process by which knowledge that is new to a person or a group of people is created based on generative processes [2];

• a process that refers to the action or process of contributing to the development of a set of knowledge, attitudes and/or beliefs [3];

• the process of cooperation with the aim of creating new understanding or knowledge that exceeds what can be achieved independently [4];

• learners work with their knowledge in such a way that they relate their new knowledge to the existing knowledge base instead of memorizing facts [5].

Thus, knowledge construction is defined as the process of independently creating new knowledge or new understanding based on existing knowledge or understanding. Experts consider this skill to be important and necessary for effective career development in modern society, because the rapid development of technologies and the rapid emergence of new professions and directions necessitates constant training and improvement of knowledge. The main task of higher education institutions is not only specific professional training, but the formation and development of the necessary abilities and skills that will help to

quickly adapt in modern society and build effective career growth.

The Stanford Research Institute, with financial support from Microsoft Partners in Learning, developed the Innovative Teaching and Learning Research Project (2012). This project was aimed at helping teachers plan such learning activities that would provide students with opportunities to build and develop the 21st century skills [1]. Planning for 21st Century Learning includes rubrics that consider specific 21st century skills: collaboration, knowledge construction, self-regulation, real-world problem solving and innovation, using ICT in learning and skilled communication. The study of each skill covers two types of rubrics: the study planning rubric and the student work rubric. In particular, the purpose of the knowledge construction rubric is to help teachers identify and understand the possibilities of the educational process for the formation and development of students' knowledge construction skills. The purpose of the rubric of the student's work regarding the development of knowledge construction skills is to determine the degree of demonstration of knowledge construction skills by students' work [6].

Knowledge construction, according to experts [6], requires students to generate ideas and understanding that are new to them. Students can do this through processes such as interpretation, analysis, synthesis, evaluation. The process of knowledge construction is considered to apply the knowledge that students have acquired in different contexts, promoting deeper understanding by linking information and ideas from two or more academic disciplines. Experts define [6] that the process of knowledge construction occurs when students do more than reproduce what they have learnt and go beyond the reproduction of knowledge to generate ideas and understanding that are new to them.

Purpose of this study is to consider the possibilities of the discipline "Professional-Oriented Foreign language" in the context of the formation and development of students' knowledge construction as a necessary skill of future specialists. To achieve the goal set, we have to solve the following tasks, namely, to define the concept of knowledge construction, to analyze the research project "Innovative Teaching and Learning" regarding the development of knowledge construction skill, and to consider the 21st century education from the point of view of the rubrics of planning education and student work, proposed by the project, to study the attitude of the scientific and teaching staff of the university to the use of forms and methods of work that would contribute to the formation and development of knowledge construction, and the attitude of students to the forms and methods of work that contribute to the formation and development of this skill, to develop and analyze the possibilities of the educational discipline "Professional-Oriented Foreign language" in terms of the development of knowledge construction skill.

Presentation of the main material. The skill of knowledge construction is often considered to be critical thinking, which is also characterized by such types of mental activity as interpretation, analysis, synthesis, evaluation of information or ideas. Table 1 presents the definition of certain types of mental activity by experts [6] and our examples of certain types of educational activity aimed at the development of one or another type of mental activity of students of the "Sports Physiology and Rehabilitation" Educational Program at the Cherkasy Bohdan Khmelnytsky National University during the study of the discipline "Professional-Oriented Foreign language".

Table 1

Types of mental activity and kinds of educational activities aimed at their development

Types of mental activity	**Experts' definitions** [6]	**Examples of educational activities**
Interpretation	The ability to draw conclusions beyond the literal meaning	*Read the description of the physical exercise performance and conclude about its effect on the human body*
Analysis	Identifying the parts of the whole and their relationships with each other	*Read the facts about the effects of aerobic exercise on the human body and determine which exercises are likely to affect the cardiovascular system*
Synthesis	Identifying relationships between two or more ideas	*Read the article and compare or contrast aerobic and anaerobic exercise and their effects on the human body*
Evaluation	Judgments about the quality, reliability, or importance of data, ideas, or events	*Read the article on the effects of aerobic exercise and determine which influencing factors are most important and why*

At the same time, methodologists point out that if a certain type of educational activity requires students to practice what they have already learnt, or provides students with a list of actions that must be followed when performing this activity, then this educational activity does not require knowledge construction. However, if a particular learning activity requires students to develop the steps of the process independently, such learning activity requires knowledge construction [6]. Thus, knowledge construction is associated to search activity. For example, if students are assigned to read an article about a health club and describe the exercise equipment they read about, this activity would not be considered knowledge construction. If students are given the task of reading an article about a health club, analyzing

the types of recovery, classifying them into groups according to the type of injury, developing a set of exercises for a certain type of injury, this type of educational activity will contribute to the development of knowledge construction. To develop this skill, students must apply their knowledge. When students use constructed knowledge to complete other task, they are using constructed knowledge in a different context. For example, students can use the constructed knowledge about the characteristics of aerobic and anaerobic exercises to identify sports or sports activities, in which aerobic or anaerobic exercises are used. Therefore, the latter task deepens students' understanding of the nature of physical exercises and their impact on the human body and helps to look at physical exercises from a different perspective, namely, from the point of view of sports, sports activities, and their characteristics. Moreover, students not only consider certain types of exercise in another sport, but they apply interpretation, analysis, synthesis, evaluation to decide how to use what they have learnt in a new context.

The "Innovative Teaching and Learning" educational project [1] offers important ideas for planning educational activities in such a way that they contribute to the formation and development of students' knowledge construction. These ideas are based on the answers to the questions whether the learning activity requires knowledge construction, whether the main requirement of the learning activity is knowledge construction, whether students are required to apply knowledge in a new context, and whether the learning activity is interdisciplinary. As the project indicates, not every task in the educational process will include all levels of solving the problems of knowledge construction by students, but it is worth including educational experiences of all levels during the period of study. According to the project, the decision tree can be presented in the form of rubrics, indicating the code and criteria of the educational activity:

1 – learning activities do not require students' knowledge construction; students can complete tasks by reproducing information or using known procedures;

2 – learning activities require students to construct knowledge by interpreting, analyzing, synthesizing, and evaluating information or ideas, but the primary requirement is not to construct knowledge;

3 – the main requirement of the educational activities is knowledge construction, but the learning activities do not require students to apply their knowledge in a new context;

4 – the main requirement of the learning activities is the construction of knowledge, and the learning activities requires students to apply their knowledge in a new context, but the learning activities do not have learning objectives in more than one academic discipline;

5 – the main requirement of the learning activities is knowledge construction, and the learning activities require students to apply their knowledge in a new context, and the learning activities have learning objectives in more than one academic discipline; knowledge construction is interdisciplinary [1].

Since the study of each skill covers two types of rubrics: the rubric of study planning and the rubric of student work, we study the attitude of the scientific and teaching staff of the university to the use of forms and methods of work in the educational process that would contribute to the formation and development of knowledge construction, and the attitude of students to the forms and methods of work that contribute to the formation and development of this skill. 59 teachers and 278 students of Cherkasy Bohdan Khmelnytsky National University participated in the survey.

The results of the survey show that teachers use types of learning activities to reproduce information by students or to use procedures familiar to students in every lesson (58.6%) or from

time to time (39.7%). Thus, the learning activity of code 1 (according to the educational project "Innovative Teaching and Learning") is used by most teachers relatively regularly. Almost the same percentage of respondents use types of learning activities that require students to construct knowledge, namely, to use interpretation, analysis, synthesis, evaluation), but with a slight difference in frequency (52.5% of teachers - in every lesson, and 42.4% - from time to time). Thus, the learning activity of code 2 is also used quite regularly. At the same time, the percentage of teachers who do not often use such types of learning activities is relatively low (code 1 – 1.7% of teachers, code 2 – 5.1%). This percentage increases in activities of code 4 and 5 - up to 8.5% and 13.6, respectively. Thus, the frequency of teachers' use of learning activities that require students to apply their knowledge in a new context is shown in Fig. 1, and the types of learning activities with goals within the framework of more than one educational discipline, i.e., interdisciplinary, are shown in Fig. 2, respectively.

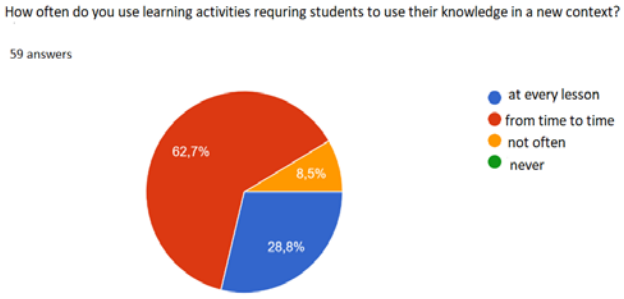

Fig. 1. *The frequency of teachers' use of learning activities that require students to apply knowledge in a new context.*

Fig.2. *The frequency of teachers' use of learning activities with the goals within the framework of more than one educational discipline.*

Thus, a certain decrease in the frequency of the use of learning activities with the increase in the code of activities in accordance with the rubrics of the "Innovative Teaching and Learning" project can be seen. This trend is quite predictable, since, as mentioned above, not every task in the educational process will include all levels of solving problems of knowledge construction by students, but it is worth including educational experiences of all levels during the period of study.

The results of the student survey show that more than half of the students, namely 64%, have a foreign language as a goal of learning because it will contribute to their future professional career. It is worth noting that 19.4% of students have this goal because a foreign language is a mandatory discipline. This fact may indicate that almost a fifth of students would not have chosen a foreign language if it was included in the block of elective subjects. At the same time, 12.9% of students do not have this goal, but are forced to study this mandatory discipline, and 3.6% do not consider it to be interesting for them. The reasons for such a situation can be seen in both objective (stereotypes built up from the time of learning a foreign language at school, insufficient opportunities for learning a foreign

language at the university, etc.) and subjective factors (personal preferences, personal inclinations, perception of a teacher, etc.).

The survey shows more than half of the students (61.2%) believe that a foreign language helps them develop the skills of knowledge construction, and they learn something new in every lesson. At the same time, 26.3% of students believe that they can learn a foreign language independently. This fact may indicate sufficient autonomy of students in knowledge construction and possibly high level of foreign language competence, in this case. 5.8% of students do not learn anything new when studying a professional-oriented foreign language, and 6.8% do not believe that a foreign language is necessary to construct knowledge of a profession. These results may indicate a negative experience of learning a foreign language or the lack of interest of the student in this educational discipline for certain objective and subjective reasons indicated above.

Regarding the facilitation of knowledge construction by the students themselves, almost half of the students (49.8%) actively work in practical classes and do home tasks, almost a third of students (28.9%) actively work in practical classes, do home tasks, and analyze, what they need to repeat from the material they have learnt, and 13.2% of students, in addition to this, also compare the material of other disciplines for an integrated picture of knowledge (Fig. 3).

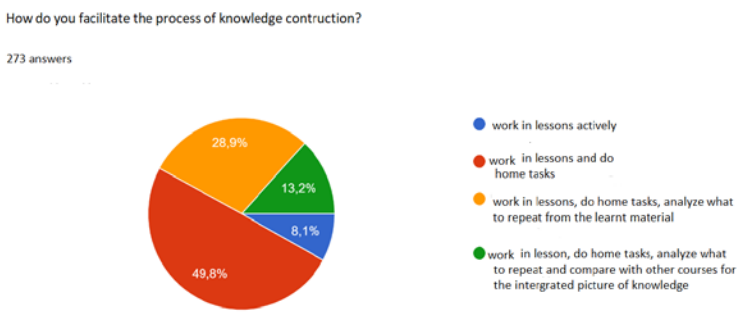

Fig.3. *Students' facilitation of the process of knowledge construction in the discipline "Professional-Oriented Foreign Language"*

Regarding the use of other sources of information and communication technologies to improve their knowledge, more than half of students (57.9%) use it from time to time, and another third of students are interested in it (36.7%) (Fig.4). It is not interesting to use other sources to improve knowledge for 5.4% of students, which corresponds to the same percentage of students who do not learn anything new in classes in the discipline "Professional-Oriented Foreign Language ", as well as for those who are not interested in this discipline. This fact may show that the reason for this indicator is not in the educational process itself, in the organization of educational activities or activities of the teacher himself, but in lack of interest in learning a foreign language in general.

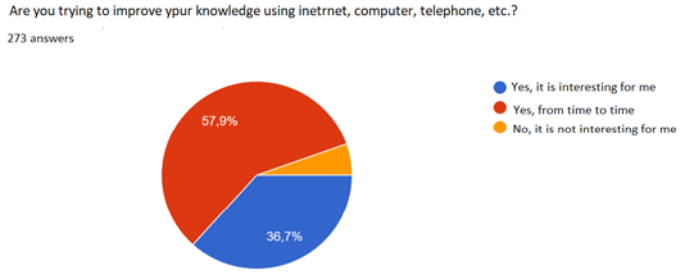

Fig.4. *Improvement of knowledge in a professional-oriented foreign language by students.*

Thus, the vast majority of students set the goal of learning a foreign language, more than half of students believe that a foreign language helps them in knowledge construction, and the majority of students contribute to knowledge construction of a professional-oriented foreign language both during educational activities and extracurricular ones, using information and communication technologies.

We consider the possibilities of the discipline "Professional-Oriented Foreign Language" concerning the

development of students' knowledge construction skills, and note the level of solving problems of knowledge construction by students covered by certain types of educational activities (on the example of the 4th-year students of the educational program 017 Physical Culture and Sports). We developed learning activities using textbooks [7,8,9,10,11,12] and coded them according to the rubrics of knowledge construction (Table 2).

Table 2

Types of learning activities aimed at developing students' knowledge construction skills

Types of learning activities	**Tasks**	**Feature according to rubrics**
Text "Fitness"	Read the text and underline words related to *sport* in blue, words related to *health* in yellow and the words related to *medicine.*	1 – learning activities do not require students to construct knowledge; students can complete tasks by reproducing information or using known procedures
English proverbs about health	*1) Read* proverbs and *think* about their equivalents in your native language; *2) read* the beginning and *think* about the end of the proverb; *3) explain* the meaning of the proverbs; *4) choose* the proverb you like most and *explain* why. *5) Find* other proverbs about health in English, *present* them to your groupmates and *ask* them to *translate* the proverbs or *find* equivalents.	2 – learning activities require students to construct knowledge by interpreting, analyzing, synthesizing, and evaluating information or ideas, but the primary requirement is not to construct knowledge
Text "Exercise Physiology"	*Read* the text again, *analyze* the features of muscle movements in isotonic and isometric exercises, *explain* the difference in resistance, *compare* these two kinds of exercise and *make a conclusion* about their beneficial effects.	3 – the main requirement of the learning activities is the construction of knowledge, but the learning activities do not require students to apply their knowledge in a new context

Text "Exercise Physiology"	*Analyze* two kinds of exercises: isotonic and isometric; *evaluate* their beneficial effect of the body; *select* different kinds of sport with the use of these exercises and *divide* them into three groups: 1) sports in which isotonic exercises are used 2) sports in which isometric exercises are used 3) sports in which both kinds of exercises are used	4 – the main requirement of the learning activities is the construction of knowledge, and the learning activities require students to apply their knowledge in a new context, but the learning activities do not have learning objectives in more than one academic discipline
Text "Exercise Physiology"	*Compare* two kinds of exercise – isotonic and isometric. *Evaluate* them in terms of anatomy: • cardio-vascular system • heart activity • muscular fibers • muscular activity	5 – the main requirement of the learning activities is the construction of knowledge, and the learning activities require students to apply their knowledge in a new context, and the learning activities have learning objectives in more than one academic discipline; knowledge construction is interdisciplinary

Thus, the types of educational activities that are used during the study of the discipline "Professional-Oriented Foreign Language" have a possible potential for the development of students' knowledge construction skills, since they allow the development and distribution of forms and types of training in accordance with the rubrics proposed by the "Innovative Teaching and Learning" project. We can highlight all the codes and criteria of learning activities presented in the decision tree of the project "Innovative teaching and learning".

Conclusions. Thus, at the current stage of society's development, the educational sector is characterized by innovative approaches to learning and teaching, contributing to the formation and development of students' skills that will help them adapt to modern society and be successful in it. Among the

necessary skills of the 21st century, knowledge construction occupies an important place. This skill requires students to generate ideas and understanding that are new to them through processes such as interpretation, analysis, synthesis, evaluation. The process of knowledge construction applies the knowledge that students have acquired in different contexts, promoting deeper understanding by connecting information and ideas from two or more academic disciplines.

The study of the opinion of the scientific and pedagogical staff and students of the Cherkasy National University shows that teachers have educational experience of developing students' knowledge construction skills at all levels during the period of study with different frequency, however, there is a certain decrease in the frequency of using the type of educational activities depending on the growth of the code of these activities in accordance with the rubrics of the educational project "Innovative Teaching and Learning". Most students set the goal of learning a foreign language, more than half of students believe that a foreign language helps them in knowledge construction, and the majority of students contribute to the construction of knowledge of both during educational activities and extracurricular ones, using information and communication technologies.

The analysis of the types of educational activities in learning a professional-oriented foreign language shows that this discipline has potential opportunities for the development of students' knowledge construction skills, as it allows to determine all the codes and criteria of educational activities aimed at the development of this skill.

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