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THE USE OF MODERN LEARNING TECHNOLOGIES IN ACCORDANCE WITH BLOOM'S TAXONOMY IN THE EDUCATIONAL PROCESS

In this article the theoretical materials in accordance with Bloom's taxonomis explored in which tasks are classified into 6 levels: the first level is "Knowledge", the second level is "Understanding", the third level is "Application", the fourth level is "Analysis", the fifth level is "Synthesis" and the sixth level is "Assessment". Theoretical materials are dealt with in accordance with Bloom's taxonomy of the discipline "History of Education". The assessment criteria form the subject, instrumental and interpersonal competences. As the discipline in subject competence the student owned the pedagogical technology in the high level; the student also can use interactive forms of training, he knows tasks selection criteria for differentiated instruction with instrumental competence. The student is able to use interactive forms of learning: dialogue, debates, discussions, work in pairs, in groups, and can use the parts retrieval, problem, research methods, project methods also he is able to search for, analyze and select the desired material on the topic of study. Self-respect and respect of others is produced with interpersonal competencies; the student can work in a team and willingness to make a collective decision; the student has ability to take responsibility for the decision, the manifestation of personal enthusiasm and the ability to work in a team.

Key words: Bloom's Taxonomy, assessment criteria, subject competence, instrumental competence, interpersonal competence, the reflection of the students, teacher's reflection.

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Оқу үрдісіндегі қазіргі білім беру технологияларын Блум таксономиясымен пайдалану

Авторлар мақалада Блум таксономиясына сәйкес теориялық материалдар қарастырылған, онда тапсырмалар алты деңгейге жіктелген: бірінші деңгей – «Білім», екінші деңгей – «Түсіну», үшінші деңгей – «Қолдану», төртінші деңгей – «Талдау», бесінші деңгей – «Синтез», алтыншы деңгей – «Бағалау». Теориялық материалдар Блум таксономиясына сәйкес «Педагогика тарихы» пәні бойынша қарастырылады. Бағалау критерийлері пәндік, аспаптық және тұлға аралық құзыреттіліктерді құрайды. Пәннің құзыреттіліктері бар пәннің бөлігі ретінде студент жоғары деңгейде педагогикалық технологияны меңгереді; оқытудың интерактивті формаларын қолдануды біледі, саралап оқытуға арналған тапсырмаларды таңдау критерийлерін біледі; аспаптық құзыреттіліктермен – оқытудың интерактивті формаларын: диалог, пікірталас, жұпта, топта және т.б. жұмыс істеуді біледі, ішінара іздеуді, проблемалық, зерттеу әдістерін, жобалау әдістерін қолдануды біледі, өз бетінше іздеуді, талдауды және қажетті таңдауды біледі, зерттелетін тақырып бойынша материал; тұлға аралық құзыреттілік өзін-өзі бағалауды және басқаларға құрмет сезімін дамытады; ұжымда жұмыс істей білу; ұжымдық шешім қабылдауға дайын болу; шешім қабылдауға жауапкершілік алу, жеке ынтымақ көрінісі, ұжымда жұмыс істей білу.

Түйін сөздер: Блум таксономиясы, бағалау критерийлері, пәндік құзыреттілік, аспаптық құзыреттілік, тұлға аралық құзыреттілік, студенттер рефлексиясы, оқытушының рефлексиясы.

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Использование современных технологий обучения в соответствии с таксономией Блума в учебном процессе

В данной статье рассматриваются теоретические материалы в соответствии с таксономией Блума, в которой задания делятся на 6 уровней: первый уровень – «Знания», второй уровень

– «Понимание», третий уровень – «Применение», четвёртый уровень – «Анализ», пятый уровень – «Синтез», шестой уровень – «Оценивание». Теоретические материалы рассмотрены в соответствии с таксономией Блума в рамках дисциплины «История педагогики». Критерии оценивания формируют предметные, инструментальные и межличностные компетенции. В рамках дисциплины при предметных компетенциях студент владеет педагогической технологией на высоком уровне; умеет применять интерактивные формы обучения, знает критерии отбора заданий для дифференцированного обучения; при инструментальных компетенциях – умеет использовать интерактивные формы обучения: диалог, дебаты, дискуссии, работа в парах, в группах и т.п., умеет использовать частично-поисковые, проблемные, исследовательские методы, методы проектов, умеет самостоятельно искать, анализировать и отбирать необходимый материал по изучаемой теме; при межличностных компетенциях вырабатывается самоуважение и уважение других; умение работать в коллективе; готовность принимать коллективное решение; способность принимать ответственность за принятое решение, проявление личного энтузиазма, умение работать в команде.

Ключевые слова: таксономия Блума, критерии оценивания, предметные компетенции, инструментальные компетенции, межличностные компетенции, рефлексия студентов, рефлексия преподавателя.

Introduction

The concept of “taxonomy” (from Greek. taxis - order and “nomos” - law) is borrowed from biology. It means a classification of objects that is based on their natural relationship and uses categories arranged sequentially to describe them. In the practice of training, quite often the training goals are formulated very vaguely, remain unconstructive, ambiguously understood. This problem is solved by building a clear system of goals, within which their categories and successive levels (hierarchy) are highlighted.

Such systems are called the taxonomy of learning goals. A fundamental and already become classic concept is the taxonomy of educational goals, developed by a group of American psychologists and educators under the guidance of Professor Benjamin Bloom of the University of Chicago in the early 50s of the twentieth century.

Despite the fact that the Bloom taxonomy was developed more than 60 years ago, it still remains one of the most popular systematizations of educational goals among both academic scientists and practical teachers.

The purpose of the article is to reveal the levels of Bloom’s taxonomy when using modern teaching technologies in the educational process when students study the discipline “History of pedagogy”.

Method of research. The author used such research methods as theoretical analysis and synthesis of foreign scientific literature on the use of modern teaching technologies in accordance with Bloom’s taxonomy in the educational process, and empirical methods of pedagogical observation.

Literature review. In 1956, Benjamin Bloom wrote the book “Taxonomy of educational goals:

the sphere of knowledge”. Since then, his six-level description of thinking has been repeatedly adapted and applied in a variety of settings. His list of cognitive processes is hierarchically organized, from the simplest recall of knowledge to the most complex, consisting in making judgments about the value and significance of an idea (Bloom, B. S., 1956).

L. Anderson and his colleagues published an updated version of Bloom’s Taxonomy that takes into account a broader set of factors that influence teaching and learning (Anderson, Krathwohl, 2001). In the updated taxonomy, an attempt is made to correct some errors in the original taxonomy. In contrast to the 1956 version, the new Taxonomy distinguishes between knowing “what about” - the content of thinking, and knowing “how about” - the procedures used in solving problems. The dimension of Knowledge is the knowledge of “what about”. It has four categories: factual, conceptual, procedural, and metacognitive. Actual knowledge includes isolated pieces of information, such as dictionary definitions and knowledge of specific details. Conceptual knowledge consists of information systems, such as classifications and categories. Procedural knowledge includes algorithms, heuristics, empirical methods, techniques, and methods, as well as knowing when to use these procedures. Metacognitive knowledge refers to knowledge about thought processes and information about how to effectively manage these processes.

Measuring the Cognitive Processes of Bloom’s refined Taxonomy, just like the original version, has six skills. They include - from the simplest to the most complex: (a) remember, (b) understand, (C) apply, (d) analyze, (e) evaluate, and (f) create.

Memory consists of recognizing and recalling relevant information from long-term memory.

Understanding is the ability to form your own meanings from educational material, such as a read text or a teacher's explanation. The skills included in this process include interpretation, example explanation, classification, generalization, inference, comparison, and explanation.

The third process, application, refers to the use of a procedure learned in a familiar or new situation. The next process, analysis, consists of decomposing knowledge into components and understanding the relationship of parts to the overall structure. Students learn to analyze and discuss in the course of differentiation, organization, and explanation. The score at the top in the original taxonomy is the fifth of six processes in the updated version. It includes verification and criticism (Anderson, Krathwohl, 2001).

Creativity, a process not included in the earlier taxonomy, is the highest component in the new version. This skill involves connecting what is already known to create something new. To complete creative tasks, students generate, plan, and produce.

According to this taxonomy, each level of knowledge can relate to each level of cognitive process, so that the student can remember actual or procedural knowledge, understand conceptual or metacognitive knowledge, or analyze metacognitive or actual knowledge (Costa, 2000). According to Anderson and his colleagues, meaningful learning will provide students with the knowledge and access to the cognitive processes they will need to successfully solve problems.

Russian educators, scientists also considered this problem in their publications: active learning methods (Kuryanov, Polovtsev 2011), Designing learning outcomes using the modified taxonomy of Bloom (Babikova 2015), On the effectiveness of using Bloom's taxonomy in the extra-curricular activities at a university (Dzhishkariani, Mikava, 2017), Description of cognitive competence on the basis of Bloom's taxonomy (Korabel' 2008), Efficiently organize the independent work of students (Malkin 1966), in which they showed the importance of using modern learning technologies in accordance with Bloom taxonomy in the educational process.

Results and discussion

Didactic tasks in the classroom on the pedagogical cycle of disciplines at the University on a competency-based basis can be implemented through training tasks for students. In order for these tasks to ensure the development of the student's personality - to teach them to think, act,

and form stable behavior skills in real life situations, to maintain the need for learning throughout life, theoretical materials are provided in accordance with the bloom taxonomy, in which tasks are classified into 6 levels.

The first level - "Knowledge" - is aimed at learning to synthesize information, that is, to transfer information from the words of the teacher, from the pages of the textbook and other sources to the storehouse of memory, that is, to turn information into knowledge. This category refers to the memorization and reproduction of the studied material. We can talk about different types of content-from concrete facts to complete theories. A common feature of this category is the recall of relevant information. At this level, the student knows (remembers and reproduces) the terms used; knows the specific facts; knows the methods and procedures; knows the basic concepts; knows the rules and principles.

The second level of "Understanding" is aimed at learning how to manipulate knowledge (to represent in various forms the internalized information that has got into memory). A measure of the ability to understand the meaning of studied can serve as conversion (translation) of material from one expressions to another is his "translation" from one "language" to another (e.g., from verbal forms in mathematics). As an indicator of understanding, the student's interpretation of the material (explanation, summary) or the assumption about the further course of events (prediction of consequences, results) can also act as an indicator of understanding. These learning outcomes are superior to simply memorizing the material. Here the student understands facts, rules, and principles; interprets verbal material, diagrams, graphs, and diagrams; converts verbal material into mathematical expressions; and presumably describes future consequences arising from the available data.

The third level "Application" - refers to the ability to use the studied material in specific conditions and new situations. This includes applying rules, methods, concepts, laws, principles, and theories. Relevant learning outcomes require a higher level of proficiency than understanding.

The student uses concepts and principles in new situations; applies laws, theories in specific situations and practical situations; and applies a method or procedure.

The fourth level of "Analysis" - is aimed at learning the algorithm of analysis (elementary by means of mental operations) on the basis of early acquired knowledge to discover new knowledge.

This category refers to the ability to break a material into its component parts so that its structure is clearly visible. This includes the relationship between the parts of the whole, identifying them, understanding the principles of the organization of the whole.

The student identifies hidden (implicit) assumptions; sees errors and omissions in the logic of reasoning; makes distinctions between facts and consequences; evaluates the significance of data.

The fifth level of “Synthesis” aims to teach the synthesis algorithm (elementary by means of a mental operation) on the basis of early acquired knowledge to discover new knowledge. Before performing such a task, the algorithm for performing this mental operation is given. This category denotes the ability to combine elements so as to obtain a whole that has novelty. This new product can be a message (speech, report), an action plan, or diagrams that organize the available information. Achieving relevant learning outcomes involves creative activities aimed at creating new schemes and structures.

The student writes a short creative essay; offers a plan for conducting an experiment; uses knowledge

from various fields to make a plan for solving a particular problem.

The sixth level “Assessment” is aimed at learning to make conclusions in a specific life situation based on previously acquired knowledge and life experience. This category refers to the ability to evaluate the value of a particular material (statement, artwork, research data, etc.). The student’s judgments should be based on clear criteria: internal (structural, logical) and external (compliance with the intended goal). The criteria can be determined by the student himself or offered to him from outside, for example, by the teacher. This category is intended to achieve the learning outcomes of all the preceding categories. The student evaluates the logic of building material in the form of written text; evaluates compliance of conclusions with the available data, the significance of a product activities, based on internal criteria; evaluates the significance of a product activities, based on external criteria. Let’s consider theoretical materials in accordance with bloom’s taxonomy in the framework of the discipline “ history of pedagogy” (figure 1).

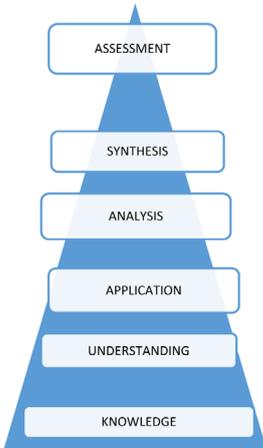
	Assessment of the history of foreign pedagogy; history of pedagogy in pre-revolutionary Russia and Soviet pedagogy; history of pedagogy development in Kazakhstan.
	Synthesis of the history of formation and development of the sphere of education, the essence, content and structure of educational processes.
	Analysis of works of classics of pedagogy, concepts and experiences of education
	Application in pedagogical practice.
	Awareness of the need to acquire skills on specific practical knowledge of family and organizational forms of social education.
	Knowledge of the most important facts of the theory and practice of education from ancient times to the present day.

Figure 1 - Theoretical materials in accordance with Bloom’s taxonomy in the framework of the discipline “History of pedagogy”.

The taxonomy of educational tasks is well technologized: for each level, the typology of educational tasks is defined; verbs are specified with which to start the educational task; the main operands that should be used in the presentation of the educational task are specified. Tasks that form behavioral skills are aimed at developing competencies that are mandatory for all students. Training tasks should be clear, clear and understandable for each student. If the task requires additional explanation, it

is not a perfect task. Sentences should be laconic and should always start with a verb (which is what I – the student should do).

Educational tasks can form the following skills (Leites, 2000):

- reproductive skills – activities that consist in the ability to repeat or reproduce learned information without distorting its meaning;

- cognitive skills – activities that require cognitive skills aimed at transforming explicit or

hidden information. The basis of such skills is knowledge that is necessary for further knowledge of the discipline or is transformed into interdisciplinary knowledge;

– behavioral skills are those external and internal forms of behavior through which a person manifests his self-perception, perception of others, perception of various life situations through his manner of reacting and acting.

These skills are based on vital knowledge that dominates everyday life. The ratio of tasks of reproductive, cognitive and behavioral types is determined by the teacher. For this purpose, it is necessary to adhere to the following recommendations for conducting classes:

– students should not interfere with each other, when a question appears, raise their hand. After listening to the question, do not rush to give the student an answer, but tell him what to pay attention to and where to find the answer.

– each student starts with the first task and works throughout the class. Here you can use many

methods of self-checking, mutual verification, using the “inspector” in a small group, etc.

– the number of tasks completed by a student depends on his intellectual and creative abilities. All students are actively working at this stage, and the teacher only manages the learning process (teacher was actively preparing for the lesson).

In a short period of completion class follows the reflection: if you have achieved the objectives of the class and assess students, which we shared on the development and means of formation of reflection in table 1. For this purpose, there are many forms and methods: self-assessment; knowledge control; mutual assessment, etc. At this stage, students form one of the important competencies-the ability to give self-assessment. This competence is necessary throughout life and especially at the initial stage of their educational trajectory. Keep in mind that a student’s assessment cannot be publicly disclosed without their permission.

Table 1 – Reflection of students at the stage of working on the project in the framework of discipline

Conditions for the development of reflection	Means of forming reflection.
1. Formation of motivational readiness for the development of students ‘ reflexive abilities.	Organizing special interaction with students to discover the meaning and motivational significance of reflection, developing a conscious desire to focus on the process and results of mental activity.
2. Students ‘ knowledge of the structure and content of educational activities, the presence of ideas about effective ways to regulate it.	Mastering the complex of methodological knowledge: the structure of activities, types of scientific thinking, logical principles underlying scientific knowledge, evidence and explanations. System of external requirements for the organization of activities.
3. Development of the creative component of thinking.	Stimulation of independent formulation of scientific problems in developing learning. The presence of problem situations that can be solved together, taking into account the results of individual creative activity («portfolio of achievements»).
4. Implementation of the principles of systematization and problematizing is combined with the use of reflection as a method in each step of professional activity.	Game training (organizational and educational games), group work (knowledge exchange, interpersonal skills), professional activities, solving educational and production tasks.

We conducted a survey in order to know the opinion of students regarding Bloom’s Taxonomy. The questionnaire was completely anonymous and we relied on an objective assessment of the use of Bloom’s Taxonomy in the educational process. In total 52 respondents took part in the survey. All respondents are students of the Faculty of Philosophy

and Political Science of Al-Farabi Kazakh National University.

Answer of respondents to the question «Do you know Bloom’s taxonomy?» was designed as 75.0% of the respondents answered “yes”, “I can’t say” - 25.0% of the respondents; there was no “no” answer (Figure 2).

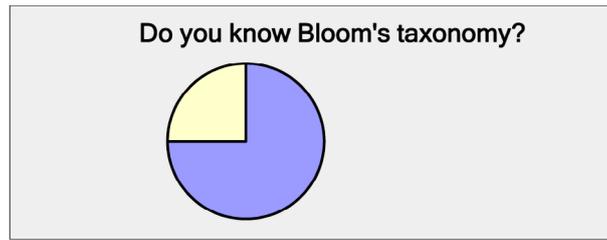


Figure 2 – Do you know Bloom’s taxonomy?

The next question “Do you use Bloom’s taxonomy in the learning process?” assumed the existence of several answers. Here the opinion of respondents was divided as follows: in the classroom work – 66.7%; when fulfilling the tasks of IWST and IWS – 33.3%. The following answer options were not selected: in extracurricular work; when performing tasks of an individual nature; during research work. To the question “Why do we

need Bloom’s taxonomy?” respondents’ opinions were divided as follows: scheme which helps to correlate issues with a certain category – 34.5%; from the simplest to the most complex – 37.5%; it believes that knowledge is in the “base of the pyramid” – 28%.

We were pleased with the answers to the question “Do you follow Bloom’s Taxonomy in the syllabus?”, as all respondents answered “yes”

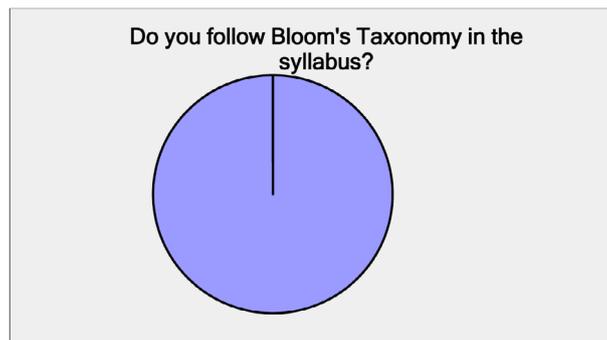


Figure 3 – Do you follow Bloom’s Taxonomy in the syllabus?

An ambiguous opinion is observed in answering to the question “Will you use Bloom’s Taxonomy in the future?”. The answer “yes” is casted by the

majority of respondents i.e 75.0%, the answers “no” and “do not know” collected the same percentage i.e 12.5% each.

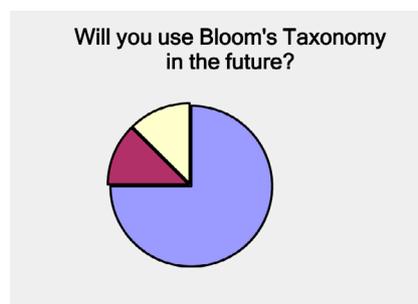


Figure 4 – Will you use Bloom’s Taxonomy in the future?

From this it can be noted that students know about Bloom's Taxonomy, they understand its need for use in the educational process. Students are able to use it in educational activities and plan to use it in their future activities.

Also a prerequisite is the reflection of the teacher, who asks himself such questions as: have you completed the goals and objectives of the project? has positive work with students been achieved? If not, what is the reason? what result did you achieve when conducting classes on problem situations?

Conclusion

Thus, in this article, we have tried to consider the use of modern learning technologies in accordance with the Bloom taxonomy in the educational process. This issue is relevant, since the

evaluation criteria form subject, instrumental, and interpersonal competencies. Within the discipline when the subject competences the student masters the teaching technology at a high level; knows how to use interactive forms of learning, knows the criteria for selecting the assignments for differentiated learning; instrumental competences the student is able to use these interactive forms of learning, dialogue, debate, discussion, work in pairs, in groups, etc., is able to use partial search, problem, research methods, methods of projects, able to independently seek, analyze and select the appropriate material on a studied subject; in interpersonal competencies is produced by the esteem and respect of others; student is able to work in a team; willingness to make a collective decision; the ability to take responsibility for the decision, takes a personal enthusiasm.

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