

## THE USE OF THE BLUM AND KRATVOL TAXONOMY IN THE TEACHING OF SPECIAL DISCIPLINES

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**Abstract .** This article tells about the work of Kratvol and Blum as a researcher, about the history of the emergence of taxonomies of educational purposes, about samples of verbs, the stages of which correspond to the levels of thinking.

**Key words:** taxonomy, knowledge, understanding, analysis, synthesis, application, understanding, definition, learning objectives.

### ИСПОЛЬЗОВАНИЕ ТАКСОНОМИЙ БЛУМА И КРАТВОЛЛА В ПРЕПОДАВАНИИ СПЕЦИАЛЬНЫХ ДИСЦИПЛИН.

**Аннотация.** В этой статье рассказывается о работе Кратволла и Блума в качестве научного сотрудника, об истории возникновения таксономий учебных целей, об образцах глаголов, этапы которых соответствуют уровням мышления.

**Базовые слова и фразы:** таксономия, знание, понимание, анализ, синтез, применение, понимание, определение, цели обучения.

**Introduction.** The use of information technologies, Internet materials, additional popular science literature, and fiction in teaching specialized subjects will yield the desired results. In this regard, special attention is paid to ensuring inter-subject communication, inter-course consistency and continuity. The teaching process is a creative process in constant development, in motion. In the current information age, knowing what and how to teach is a key factor determining the quality of students' knowledge.

Taxonomy (from the Greek taxis - arrangement, order, and nomos - law) is the theoretical and practical branch of systematics that classifies organisms. The term was proposed by the Swedish botanist O. Decandol (1813). Taxonomy is sometimes used as a synonym for systematics and classification, but systematics is usually considered the science that studies the diversity of organisms and their relationships, while Taxonomy is the science that studies the principles, methods, and laws of classification. Traditional methods of classification are based on identifying the similarities of organisms, the homology of their characteristics, and a common origin. The main task of taxonomy is to create a rational doctrine of taxonomic categories and their hierarchy, which allows for the production of a natural classification of organisms. Taxonomy is a theory of classification and systematization of complex structured areas of existence.

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**Literature review.** Bespalko V.P., M. Ochilov in their research work noted that the use of M. B. Bloom's taxonomy allows for the expression of more general educational goals (in cases where it is difficult to express a specific educational goal), V.I. Baydenko expressed his views on the taxonomies recommended by V. Bloom and other taxonomies R.H. Dave (Wauwe (1970) , E. Simpson ( 1972). David Reading Kratwall (May 14, 1921 – October 13, 2016) was an American psychologist and educator. He is the director of the Bureau of Educational Research at the University of Michigan, and he has served in various capacities as a member of the USOE Bureau of Research Advisory Committee. He served as regional chairman of the board of trustees of the Eastern Regional Educational Institute, a past president of the American Educational Research Association. David Reading Kratwall was born in Chicago on May 14, 1921. He was the son of William Charles and Marie Kratwall. After graduating from the University of Chicago with a bachelor's degree, he served in the U.S. Army during World War II and then returned to the University of Chicago, where he earned his master's degree. He was also a research fellow at the Behavioral Science ADVANCED Research Center at Stanford University.

Still an active member of AERA, he worked in the Measurement and Research Methodology Department.

**Research Methodology.** In today's education system, in our republic, Uzbekistan, Russia, the USA, England, and some other countries, the goals of education are expressed separately for teachers and students. There is a certain logic in this, because education is a joint teaching and learning activity of a teacher and a student. In this process, the goal refers to both the teacher's activity (teaching, explaining, demonstrating, telling), and the student's activity in the form of actions in which the educational result, educational tasks, are mastered. That is, educational tasks mean that students need to learn and be able to perform (actions, knowledge and skills that they did not know or could not do before) by the end of this lesson.

**Analysis and results.** Krathwohl, who is the Hannah Hammond Professor of Education Emeritus at Syracuse University, independently developed a taxonomy of the affective domain organized according to the principle of Internalization. Internalization is "the process by which a person's affect toward an object moves from a level of general awareness to a point where the affect is internalized and consistently guides or controls the person's behavior." This taxonomy consists of five stages. This includes: receiving, responding, evaluating, organizing, and describing.. David Carwall made a major contribution to Bloom's taxonomy. This created a basis for classifying the requirements learned as a result of the study. Kratvol described it as "a means of facilitating the exchange of test items between instructors at different universities, each measuring the same educational objective." Kratvol and Blum collaborated closely while studying at the University of Chicago. Although Bloom's original taxonomy consisted of six categories, many people have suggested that when it was revised, it consisted of four more specific categories. These categories are known as knowledge measurement components and include: factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. Each of these categories is broken down into smaller, more complex parts than the original taxonomy. It is then divided into six different categories: remembering, understanding, analyzing, applying, evaluating, and creating.

In revising the taxonomy in 2001, Kratvol helped to reexamine and separate the interactions between two dimensions: cognitive processes and knowledge content. In addition, he helped to present new discoveries in psychology and education in different directions. Another ideal that they collected was that cognitive processes are presented in the form of verbs and knowledge content in the form of

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nouns. He also changed the methodological level of evaluation and synthesis to creativity. Kratvol died on October 13, 2016.

Benjamin Blum (1913-1999) The taxonomy of learning objectives based on levels of cognitive activity, a system of questions and tasks developed by the famous American psychologist and educator Benjamin Blum, is quite widespread in the modern world of education. The taxonomy of learning objectives is a systematic classification or systematization of specific actions that indicate a certain level of student mastery, by sequentially placing objects of increasing complexity in content based on natural interrelationships.

Bloom's Taxonomy is a classification of various goals achieved through formal education. It was created by Benjamin Bloom in 1956 to promote higher-order thinking methods in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than simply memorizing facts (deductive learning).

The framework developed by Bloom and his collaborators consisted of six main categories: Knowledge, Understanding, Application, Analysis, Synthesis, and Evaluation. The categories following knowledge were presented as "skills and abilities" because they were a prerequisite for the practical application of knowledge, skills, and competencies. Within each category, there are subcategories, all of which proceed from simple to complex and from concrete to abstract, while the taxonomy is differentiated according to the six main categories.

Bloom's original taxonomy from 1956. Brief explanations of these main categories and their authors: Knowledge. This involves the recovery of specific and universal aspects, the recovery of methods and processes, or the recovery of a pattern, structure, or configuration. Comprehension. You can use the material or idea being conveyed without connecting it to other material or seeing its full impact. Analysis. This involves breaking down the communication into its constituent elements or parts so that the relative hierarchy of ideas and the relationships between the ideas expressed are clear. Synthesis. This involves putting elements and parts together to form a whole.

A group of cognitive psychologists, curriculum theorists, and researchers in testing and assessment published a revision of Bloom's Taxonomy in 2001 under the title Taxonomy for Teaching, Learning, and Assessment. This title diverts attention from the somewhat static notion of "learning objectives" (in Bloom's original title) and points to a more dynamic understanding of the classification. Therefore, educational professionals today rely on this updated Bloom's Taxonomy, which can be used in teaching and learning in any field of learning. The authors of the revised taxonomy emphasized this dynamism by labeling their categories and subcategories (instead of the names of the original taxonomy) using verbs and concepts. These "action words" describe the cognitive processes by which thinkers encounter and work with knowledge:

1. Remember (recognize, recall)
2. Understand (explain, exemplify, classify, generalize, compare, explain)
3. Apply (perform, implement)
4. Analyze (distinguish, organize, attribute)
5. Evaluate (examine, criticize)
6. Create (produce, plan, produce)

In the revised taxonomy, knowledge is at the core of these six cognitive processes, but their authors created a separate taxonomy of the types of knowledge used in cognition:

1. Factual knowledge (knowledge of terminology and specific details or elements);



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2. Conceptual knowledge (knowledge of classifications, categories, principles, generalizations, theories, models or structures);
3. Procedural knowledge (knowledge of skills, algorithms, techniques and methods, criteria for using relevant procedures);
4. Metacognitive knowledge (strategic knowledge, cognitive tasks and self-awareness).

Why use Bloom's Taxonomy?

The authors of Bloom's Taxonomy see absolute effectiveness in this, as they see it as a didactic response to learning for everyone. They believe that Bloom's Taxonomy should be used because:

Learning objectives or goals are set, which is essential for having a good pedagogical exchange. Teachers and students understand this from the very first type of educational exchange.

The objectives are well organized, which helps to identify the most important ones for students.

Organizing your objectives helps teachers and professors plan appropriate instruction, develop appropriate assessment tasks and strategies, and ensure that instruction and assessment are aligned with the stated objectives.

Bloom's taxonomy clearly defines the goals that should be achieved in a particular type of learning, so it can make the work of teachers easier, and students always know what to expect. The student should also be the hero of their own learning, and even though the goals are set, the student should always be a participant in what happens in this educational process. Bloom's taxonomy stages:

**Knowledge:** is the initial level of thinking, in which the reader knows, remembers, repeats terms, specific rules, concepts, facts, criteria, directions, categories, classifications, as well as abstract knowledge: principles, axioms, theorems, generalizations, structures, etc., and is able to describe the events of the work.

**Comprehension:** When thinking at the level of understanding, the student understands facts, rules, drawings, and tables, can rearrange them, transform them (from words to numbers or images), and predict future consequences based on the available information.

**Application:** At the level of thinking, the student is able to use the knowledge they have acquired not only in traditional but also in non-traditional situations and correctly apply it based on a specific model, formula, or instruction.

**Analyzing:** At the level of thinking, the student can distinguish parts of a whole and the relationships between them, see errors based on logical thinking, distinguish between facts and consequences, and evaluate the significance of information.

**Synthesis:** At the level of generalization, the student performs creative work, develops a plan for conducting an experiment, uses knowledge from several areas. Based on individual materials, he creates an image, a view of the whole, the whole. This stage requires creative activity that emphasizes the creation of a new table from the relevant results.

**Evaluation:** This category requires the achievement of learning outcomes in all of the categories listed above and evaluative judgments based on clearly stated criteria. Evaluating based on internal and external criteria, the student is able to distinguish criteria, adhere to them, see the diversity of criteria, assess the consistency of conclusions with available information, and distinguish between facts and evaluative opinions

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Level 1 knowledge	
Main categories of learning objectives	Student performance indicators
Repetition or recognition of information, a category in which information and data are memorized by recalling them. The level of knowledge and thinking is low. At this level, tasks such as tests, replacing missing characters, memorizing or repeating definitions and names, and repeating processes are used.	Current terms (remembers and repeats);  Knows real facts;  Knows work procedures;  Knows basic concepts; Knows rules, regulations.
Level 2 knowledge	
The level of knowledge and thinking is average. The following actions can be considered as understanding the educational material: translation - transferring educational material from one "language" to another "language" (for example, verbally expressing mathematical formulas; presenting verbal information in tables, diagrams, etc.); interpretation - presenting educational material "in one's own words", a brief description; Prediction - predicting what the conversation will be, its consequences and results based on educational material.	Understands facts, rules, principles; Converts verbal material, charts, graphs, diagrams; Converts verbal material into mathematical concepts; Describes possible future consequences of this information
Level 3 application	
The level of knowledge and thinking is average. This category includes the application of educational materials in real situations and in completely new situations. This includes the practical application of rules, methods, concepts, laws, principles, theories. The learning outcomes require a deeper level of mastery than the color level of the material.	Applies concepts and principles to new situations; Apply laws and theories to real-world situations; Indicate whether a method or workflow is being used correctly.
Level 4 analysis	
The level of knowledge and thinking is the highest level. To clarify the structure of the educational material, break it down into components: separate the whole into parts; identify the relationships between the parts of the whole, feel how the whole is organized. This category refers not only to the	Reveals hidden (invisible) things; Identifies errors and shortcomings in the development of thought; Distinguishes facts and their

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perception of the content of the educational material, but also to how its internal structure is formed.	consequences; Determines the significance of the presented evidence.
<b>Level 5 synthesis</b>	
The level of knowledge and thinking is the highest. The assembly of a whole (result) of an innovative nature from the elements of the educational material. As a new result, we mention a message (report, speech), a work plan, schemes, which organize educational materials in a completely different way. Such educational results require the use of creative activity that creates new content and new structures.	Writes a short creative work (essay); Presents his/her plan for an experiment; Uses his/her knowledge creatively to solve any problem.
<b>6th grade level</b>	
The highest level of knowledge and thinking is the level of achievement of the learning outcomes of the previous categories.	Evaluates the structural logic of educational material in writing; Determines the significance of educational material based on internal or external criteria; Determines the relevance of decisions and conclusions to facts.

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Verb patterns according to levels of thought	
<b>KNOW</b>	<b>UNDERSTANDING</b>
to be able to recall, to reinforce, to convey information, to tell, to write, to express, to recognize, to repeat, to repeat	justify, replace, clarify, define, explain, translate, rearrange, illuminate, interpret, clarify
<b>APPLICATION</b>	<b>EVALUATION</b>
implement, calculate, demonstrate, use, teach, determine, implement, calculate, apply, solve	diagnose, prove, measure, control, justify, approve, evaluate, verify, compare, compare
<b>ANALYSIS</b>	<b>SYNTHESIS</b>
to cause, to separate, to stratify, to classify, to guess, to predict, to spread, to distribute, to examine, to group	to innovate, generalize, integrate, plan, develop, systematize, compile, design

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Conclusions and Recommendations. Thus, when monitoring the level of achievement of the learning objective of students in terms of knowledge according to Bloom's taxonomy, it is appropriate to determine the level of their assimilation of information and knowledge on a particular topic. To do this, the student must be able to remember and repeat terms, rules, concepts, facts, criteria, directions, categories, describe the events of the work, give them a definition, process information, express his opinion, and highlight the specific features of an object or event.

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