BLOOM'S TAXONOMY: ADVANTAGES AND LIMITATIONS

ТАКСОНОМІЯ БЛУМА: ПЕРЕВАГИ ТА ОБМЕЖЕННЯ

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The paper offers a detailed analysis of Bloom's taxonomy of educational objectives and the revised Bloom's taxonomy. Original Bloom's taxonomy places educational learning objectives hierarchically, from simple to complex. It comprises six main categories: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Although developed over sixty years ago, the taxonomy is still a useful tool for developing English lessons with clear objectives, allowing teachers to test the students' comprehension at every level of the language thinking process by asking specific questions. Bloom's taxonomy had its limitations. It has been criticized for one-dimensional classification and has caused numerous discussions among researchers. Some of the limitations were eliminated in the Revised Bloom's Taxonomy, which suggested minor but important changes. Most importantly, Bloom's major categories were changed from noun to verb forms. The cognitive levels of the Revised Bloom's Taxonomy are ordered from lower-order thinking skills (LOTS) to higher-order thinking skills (HOTS). The LOTS levels include "remember", "understand", and "apply"; and the HOTS levels include "analyze", "evaluate", and "create". The higher the thinking level in the hierarchy of the taxonomy, the higher the need to think critically and creatively.

Bloom's taxonomy, both original and revised, has numerous benefits. An important advantage of applying Bloom's taxonomy in teaching English is that it helps organize learning objectives. It shows a relationship between knowledge in the textbook and the cognitive process of learning objectives, stimulating the critical thinking process. It also provides a framework for English teachers to plan various learning activities and strategies using textbooks. Another advantage of Bloom's taxonomy is that it is a good tool for planning, implementing, and assessing instruction. The taxonomy illustrates diverse learning outcomes that can be included in any instructional area. It is beneficial for developing assignments for student exams, enabling teachers to test students' progress across all the cognitive levels of Bloom's taxonomy.

Key words: *Bloom's taxonomy, educational objectives, cognitive level, lower-order thinking skills, higher-order thinking skills.*

Стаття пропонує детальний аналіз таксономії освітніх цілей Блума та переглянутої таксономії Блума. Оригінальна таксономія Блума розміщує навчальні цілі ієрархічно, від простих до складних. Вона складається із шести основних категорій: Знання, Розуміння, Застосування, Аналіз, Синтез, та Оцінка. Незважаючи на те, що таксономія була створена понад 60 років тому, вона все ще є корисним інструментом для розробки уроків англійської мови з чіткими цілями, дозволяючи вчителям перевіряти розуміння учнів на кожному рівні процесу мовного мислення, ставлячи конкретні запитання.

Таксономія Блума мала свої обмеження. Її критикували за одновимірну класифікацію, вона викликали численні дискусії серед дослідників. Деякі з обмежень були усунені в Переглянутій таксономії Блума, яка запропонувала незначні, але важливі зміни. Найголовніше, що основні категорії Блума були змінені з форм іменника на форми дієслова. Когнітивні рівні Переглянутої таксономії Блума впорядковані від навичок мислення нижчого порядку (LOTS) до навичок мислення вищого порядку (HOTS). Рівні LOTS включають «запам'ятати», «розуміти» та «застосувати»; а рівні HOTS включають «аналізувати», «оцінювати» та «створювати». Чим вищий рівень мислення в ієрархії таксономії, тим вище потреба мислити критично та творчо.

Таксономія Блума, як оригінальна, так і переглянута, має численні переваги. Важливою перевагою застосування таксономії Блума у викладанні англійської мови є те, що вона допомагає організувати цілі навчання. Вона показує взаємозв'язок між знаннями в підручнику та когнітивним процесом цілей навчання, стимулюючи процес критичного мислення. Вона також пропонує вчителям англійської мови структуру для планування різних навчальних дій і стратегій за допомогою підручників. Ще одна перевага таксономії Блума полягає в тому, що вона є хорошим інструментом для планування, впровадження та оцінювання навчання. Таксономія ілюструє різноманітні результати навчання, які можна включити в будь-яку навчальну сферу. Вона корисна для розробки завдань для студентських іспитів, дозволяючи викладачам перевіряти прогрес студентів на всіх когнітивних рівнях таксономії Блума.

Ключові слова: *Таксономія Блума, освітні цілі, когнітивний рівень, навички мислення нижчого рівня, навички мислення вищого рівня.*

Stating the problem. English today, in the era of globalization, is gaining increasing importance as a language of international communication, science, politics, and trade. It is impossible to imagine a specialist of any profile who would not know English. In this regard, great importance is attached to studying English at all levels. This imposes on teachers and lecturers of English the obligation to skillfully formulate educational goals and strive towards their achievement.

The problem of educational objectives is a topic that has been discussed for years. Their classification allows educators to examine objectives, determine what students should know and do to achieve a certain objective. Classification of objectives creates a broad variety of educational possibilities. This is one of the core values of the original Bloom's taxonomy. The revised taxonomy also creates possibilities that highlight knowledge for empowering students, which is important for the foundation of learning. Classifying objectives allows educators to see the holistic relationships between knowledge and cognitive processes in goals.

Although Bloom's taxonomy has been actively used for decades worldwide, it is insufficiently addressed in Ukrainian methodological literature for teachers of English. At the same time, the principles of Bloom's taxonomy are usually applied in more general aspects such as developing curricula, assessment methods and pedagogical activities.

Analysis of the research and publications on the issue under consideration. Since the development of the well-known concept of the taxonomy of educational objectives and outcomes by B. Bloom and his colleagues, a large number of works have appeared in pedagogy that cover it. There is a significant number of foreign studies whose authors investigated various domains of the taxonomy, from theoretical issues to applied practical developments. Nayef E.G., Rosila N., Yaacob N. and Ismail H.N. [11] have compared different taxonomies, concluding that Bloom's taxonomy is more suitable as an analysis tool for the Educational Objective Domain. Forehand M. [6] explored teacher-student interaction within the framework of Bloom's taxonomy. Researchers Stevani M. and Tarigan K. [12], Djallel B. [5], Izzatul L. and Fitriyah E. [9], Iravan A. and Diptoadi V.L. [8] concentrated on the evaluation of textbooks in terms of their correspondence to Bloom's taxonomy. Test construction and evaluation of students' learning were the focus of research by Gichuhi C. [7], Boeren E. and Iniguez-Berrozpe T. [4], Lister R. [10]. Almerico G.M. and Baker R.K. [1] developed a list of Bloom's taxonomy illustrative verbs for educators' use. Among Ukrainian researchers, the topic has not found wide recognition.

The purpose of the paper is to synthesize the knowledge gained by researchers of Bloom's taxonomy and the revised Bloom's taxonomy and explore various options of applying this knowledge in the process of teaching/learning English.

Presentation of the main material. Bloom's taxonomy is a classification system of educational learning objectives developed by Benjamin Bloom and his collaborators Max Englehart, Edward Furst, Walter Hill, and David Krathwohl. Taxonomy means that the objectives are hierarchically placed in order from simple to complex, so each simple step is a prerequisite for a more complex one. The hierarchy also foresees the movement from gaining concrete meanings to abstract ones.

The original taxonomy comprises six main categories: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. All the main categories include sub-categories except Application.

(1) Knowledge. Knowledge can be defined as remembering previously learned material. It involves recalling a wide range of materials, from specific facts to basic concepts, methods, procedures, principles, and theories. Knowledge forms the lowest level of learning outcomes in the cognitive domain. It is either retrieving information from the text or differentiating the correct information from the wrong one by the readers. R. Lister defines knowledge as the level at which the student can recall and reproduce a fact, especially if prompted by the teacher, without necessarily understanding its meaning or significance [10, p. 81].

(2) Comprehension. Comprehension is the ability to grasp the meaning of materials. Learners who reach this level can transform ideas from one form to another, interpret materials by explaining them to others or summarizing them, and make predictions regarding possible effects and consequences [11, p. 168]. Comprehension is a type of understanding when the learner gains full knowledge of the message contained in the material and can make use of the material or idea being communicated. At the same time, the person does not necessarily relate it to other material or understand the whole variety of possible implications [3].

(3) Application. Application refers to the ability to use learned material in new situations unrelated to it. It can also be demonstrated by the unprompted use of an abstraction [Armstrong]. This ability includes the application of rules, methods, concepts, principles, laws, and theories [13, p. 2].

(4) Analysis. Analysis is the ability to break down materials into component parts to understand their organizational structure [3]. Applying analysis means that learners can identify separate parts of the whole and understand the relationships between them due to the ability to recognize the principles according to which the information is organized. It is a complicated task requiring focusing on multiple components [11, p. 168]. Since understanding both the content and the structural form of the material is required, the learning outcomes of analysis represent a higher intellectual level than the previous ones. The authors considered application and analysis to be intermediate levels of the taxonomy. The expectation is that learners can create and analyze materials, but still cannot go beyond a certain well-defined context [10, p. 81].

(5) Synthesis. Synthesis involves combining elements and parts to form a whole [3]. This ability is connected with the production of some unique content. It can be a speech prepared by a student, a developed plan or research proposal, or even some abstract ideas, like a scheme or framework for classifying information. Creativity is important to achieve the learning outcomes in this area. The ability to design and produce new ideas and structures or patterns is of paramount importance [11, p. 168-169].

(6) Evaluation. Evaluation involves making judgments about the value of materials and structures for given purposes [3]. The availability of a set of definite criteria the judgments should be based on is a necessary condition for proper evaluation. These criteria

can be internal (organization) or external (relevance to the purpose). Additionally, they can be determined by the students themselves or provided by the teacher. The learning outcomes related to evaluation are the highest in the cognitive hierarchy because they comprise all the elements of the lower categories as well as conscious value judgments based on clearly defined criteria [11, p. 169].

Bloom's taxonomy has been widely used in education for the past 60. It was a guideline to easily create English lessons with clear objectives by asking specific questions to test the student's comprehension at every level of the language thinking process. It also allowed the teachers to see an integrative relationship between knowledge in the textbook and the cognitive process of learning objectives [4]. The taxonomy could encourage the process of critical reading by providing a framework for English teachers to plan various learning activities and strategies using textbooks [12, p. 16].

Despite its popularity, Bloom's taxonomy has been criticized for several reasons. First, it was criticized for the one-dimensional classification of cognitive processes from simple to complex. Second, some researchers did not support the idea that lower-level goals must first be achieved to achieve a higher-level goal. Additionally, some argued that the level of evaluation is not more complex than the level of synthesis, and even that the synthesis includes evaluation [7, p. 13]. Gradually, it has become clear that Bloom's taxonomy requires revision to incorporate the developments of psychology, teaching methods, and techniques in the USA and the world since 1956. Several models have been developed, such as Wilson's taxonomy (an adaptation of Bloom's taxonomy for mathematical sciences) and Lorin Anderson's taxonomy with a more dynamic conception of classification. The latter deserves particular attention.

Published in 2001, the revised taxonomy includes several minor but important changes. These changes occur in three categories: terminology, structure, and emphasis [6, p. 42].

Changes in terminology are the most obvious. Bloom's major categories were changed from noun to verb forms. Additionally, the lowest level of the original taxonomy, "knowledge", was changed to "remembering" because knowledge is a product of thinking, which makes it inappropriate to be described as a category of thinking. Finally, "comprehension" and "synthesis" were renamed and became "understanding" and "creating" to better reflect the nature of thinking described by each category. The subcategories of the six major categories were replaced by verbs, and several subcategories were reorganized. Thus, the categories of the revised taxonomy look as follows:

(1) Remember. Remembering involves retrieving relevant knowledge from long-term memory. Remembering knowledge is essential for meaningful learning and the ability to solve problems when that knowledge is used in some more complex tasks. The two associated cognitive processes are recognizing and recalling. Recognizing (also called identifying) involves locating knowledge in long-term memory that is consistent with the presented material. Recalling involves retrieving relevant knowledge from long-term memory [7, p. 16-17].

(2) Understand. Students understand when they build connections between the new knowledge to be gained and their prior knowledge. Cognitive processes in this category include interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining. This occurs when a student can convert information from one form of representation to another, find a specific example, produce a short statement that represents presented information, detect similarities and differences between two or more objects, events, ideas, problems, or when a student mentally constructs and uses a cause-and-effect model of a system or series [7, p. 17].

(3) Apply. Applying involves using procedures to perform exercises or solve problems. This category consists of two cognitive processes: executing when the task is an exercise (i.e., familiar to the learner), and implementing, when the task is a problem (i.e., unfamiliar to the learner) [7, p. 18].

(4) Analyze. This category involves breaking material into its constituent parts and determining how the parts are related to each other and an overall structure. It includes the cognitive processes of differentiating (determining the relevant or important pieces of a message), organizing (determining how the pieces of a message are configured), and attributing (determining the underlying purpose of the message [2, p. 22].

(5) Evaluate. Evaluating is defined as making judgments based on some criteria or/and standards. The criteria most often used are quality, effectiveness, efficiency, and consistency. They may be determined by the student or given to the student by others. The standards may be either quantitative or qualitative. This category includes the cognitive processes of checking (which refers to judgments about internal consistency) and critiquing (which refers to judgments based on external criteria) [7, p. 19].

(6) Create. This category involves putting elements together to form a coherent or functional whole, that is, reorganizing elements into a new pattern or structure. The cognitive processes involved are generating (considering a variety of possible solutions), planning (a solution method is devised and turned into a plan of action), and producing (the plan is executed) [2, p. 24].

The cognitive levels of the Revised Bloom's Taxonomy are ordered from lower-order thinking skills (LOTS) to higher-order thinking skills (HOTS). The LOTS levels include "remember", "understand", and

"apply"; and the HOTS levels include "analyze", "evaluate", and "create". The higher the thinking level in the taxonomy hierarchy, the higher the need to think critically and creatively [8, p. 61].

Structural changes transform Bloom's one-dimensional form into a two-dimensional one. The dimensions are the Knowledge Dimension and the Cognitive Process Dimension. The knowledge dimension constitutes a separate taxonomy of the types of knowledge used in cognition [3].

With the dramatic societal changes over the last decades, the Revised Bloom's Taxonomy provides an even more powerful tool to fit today's teachers' needs. Its structure clearly shows the alignment between standards and educational goals, objectives, products, and activities [6, p. 44].

The advantages of using Bloom's taxonomy in the educational process in general and in teaching English in particular are not always obvious. Many English teachers are not aware of the different cognitive levels of learning and are not familiar with the appropriate theoretical framework. That is why it is important to understand how the use of Bloom's taxonomy can benefit the process of teaching/learning English.

Some of the advantages outlined by researchers are as follows: (1) Bloom's taxonomy can be a good framework for determining the level at which a learning objective is written and the corresponding questions that need to be asked to achieve the objectives. (2) Bloom's taxonomy turned out to be more effective than other methods. It was verified in numerous studies. (3) Bloom's taxonomy can serve as a basis for determining the specific meaning of broad educational goals for particular courses or curricula [11, p. 173]. (4) Bloom's taxonomy is a good tool for planning, implementing, and assessing instruction. It has practical utility as it provides educators with a common frame of reference that explains various types of learning outcomes [1, p. 8]. (5) The taxonomy illustrates a broad variety of learning outcomes that can be included in any instructional area [11, p. 173]. (6) It is beneficial for developing assignments for student exams because, in this way, different types of questions enable teachers to test students' progress across all the cognitive levels of Bloom's taxonomy [13, p. 8].

An important advantage of applying Bloom's taxonomy in teaching English is that it helps organize learning objectives. In turn, properly organized learning objectives help English teachers plan, organize, and implement their instruction. With the principles of Bloom's taxonomy applied, they can easily create English lessons with clear objectives by asking specific questions to test the student's comprehension at every level of the language thinking process, from lower-order thinking to higher-order thinking skills [12, p. 15]. Besides, it shows a close relationship between knowledge in the textbook and the cognitive process of learning objectives. The taxonomy can stimulate the critical reading process by providing a framework for English teachers to plan various learning activities and strategies in using textbooks [5, p. 6].

Using English textbooks with the consideration of Bloom's cognitive levels is one of the preconditions of successful teaching/learning. Particularly, a good textbook is expected to provide exercises on developing higher-order thinking skills (HOTS). It helps students improve reading comprehension. That is why teachers are supposed to create teaching and learning activities that encourage the implementation of HOTS by giving the students questions corresponding to higher-level thinking found in a suitable textbook [9, p. 80]. Three benefits of using HOTS are: they help activate the students' prior knowledge, the students can implement their higher-level thinking, and they can enhance the students' interest and participation in the class.

Unfortunately, studies analyzing textbooks show that quite often, textbooks concentrate more on lower-level thinking questions than higher-level thinking [8]. Tests often contain questions that ask students to recall facts and information from the text they read. Although instructional activities may aim at developing thinking skills, classroom tests often fail to measure learning outcomes properly. Sometimes students simply try to guess what teachers' expectations are. The priority is placed on memorizing, and they respond accordingly. Thus, poor quality assessment that fails to measure higher-order thinking skills will prevent the development of those skills. It does not mean that LOTS levels are not important. The students need to pass through the LOTS levels first to advance to the next level. The higher it is, the harder it is to acquire.

Applying Bloom's taxonomy in the assessment of students' learning deserves special attention. Testing in education is an important tool assumed to determine what has been learned and to measure the extent of the learning in a systematic way. The assessment process establishes a connection between desired learning outcomes, the student's learning experiences, and the assessment tasks. Through assessment, the teacher can diagnose students' learning difficulties and plan further instruction for them.

Teachers may use standard tests from textbooks, but often the assessment of students' learning involves the use of teacher-made tests. In an education situation, a teacher knows best what goes on in the classroom, what factors can affect the testing, and, therefore, is aware of how accurate the results are. A teacher becomes an important part of the learning process [7, p. 17].

However, the research shows that English teachers do not adequately employ Bloom's cognitive levels objectives in constructing their test items. It also revealed that teachers do not adequately make use of

the action verbs in constructing test items. The findings therefore imply that training and retraining of teachers in test construction could help in improving teachers' proficiency in making tests for adequate and fair learning assessment [7, p. 27].

Thus, English teachers should develop their competence in assessing their students' reading skills. One of the ways is to construct tests based on Bloom's levels of cognitive objectives. Test items should cover all six levels of cognitive objectives identified by Bloom and later revised by Anderson and Krathwohl. The use of action verbs helps determine whether the test items developed by the teachers cover both lower and higher levels of thinking. The extent of competence in test construction should be taken into account [7, p. 29].

Conclusion. The benefits of using Bloom's taxonomy in teaching English include the possibility of determining the level at which a learning objective is written and formulating corresponding questions which need to be asked, its proved effectiveness verified in numerous studies, its serving as a basis for determining the specific meaning of broad educational goals for particular courses or curriculum, and its being a good tool for planning, implementing, and assessing instruction among others. Its important merit is that it is beneficial for preparing questions for student exams because in this way, students can be tested with different types of questions according to Bloom's taxonomy cognitive levels.

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