A REVIEW OF REVISED BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES

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Abstract

The objective of this article is to provide a brief and critical analysis of the revised taxonomy, focusing on its major revision, structure, criticism, suggestion, and possible educational applications. This review article critically examines the revised version of Bloom's Taxonomy of Educational Objectives, as presented in the book "A Taxonomy for Teaching, Learning, and Assessing," edited by Lorin W. Anderson and David R. Krathwohl in 2001. The revised taxonomy builds on Benjamin Bloom's original framework, introducing a two-dimensional model that integrates the Knowledge Dimension and the Cognitive Process Dimension. The paper provides an overview of the major structural changes and implications for educational practices and emphasis on higher order thinking skills which are essential for 21st century education. It analyzes the taxonomy's impact on instructional design, curriculum development, and assessment strategies. Additionally, the article discusses challenges and controversies surrounding the implementation of Revised Bloom's Taxonomy in contemporary educational contexts. While reviewing the book of revised taxonomy, systematic approach is used. This comprehensive review underscores the significance of the revised taxonomy in enhancing educational practices and outcomes.

Keywords: Bloom’s original taxonomy, Bloom’s revised taxonomy, curriculum alignment, pedagogy, assessment

Introduction

Bloom's Taxonomy of Educational Objectives has long been a foundational framework for educators worldwide, providing a systematic approach to defining and categorizing learning objectives.

In 1956, Bloom and his colleagues introduced the original "Bloom's Taxonomy" (Bloom et al., 1956), which comprised six primary categories within the Cognitive Domain: knowledge, comprehension, application, analysis, synthesis, and evaluation. The taxonomy aimed to classify educational objectives, particularly to enable teachers, administrators, professional specialists, and researchers to address curricular and evaluation issues with more accuracy. One of the most frequent uses of the Original Taxonomy (OT) has been to classify curricular objectives and test items

in order to show the breadth or there is an insufficient range of objectives and items spanning the six categories.

The revised version of Bloom's Taxonomy, outlined in the book "A Taxonomy for Teaching, Learning, and Assessing, 2001" builds upon the original model, offering updated terminology and a more dynamic understanding of cognitive processes. This taxonomy provides educators with a comprehensive framework for fostering higher-order thinking skills (HOTS) and promoting deeper levels of understanding among students. This review article explores the significance of the revised taxonomy in shaping teaching, learning, and assessment practices in modern education. Despite the widespread adoption, original Bloom's taxonomy faced criticism for its rigidity and lack of adaptability to contemporary educational needs. In response, Anderson and Krathwohl revised the taxonomy in 2001, aiming to create a more flexible and comprehensive framework for teaching, learning, and assessing educational objectives.

Krathwohl (2002, p. 212) states that Bloom saw the original taxonomy as more than a measurement tool. A team of cognitive psychologists, curriculum and instructional researchers, along with testing and assessment experts, updated the original taxonomy (Anderson et al., 2001). In order to understand the rationale and philosophy underlying the Revised Bloom's Taxonomy, we have to highlight the assumptions underlying the original taxonomy. It was assumed that mastery of each simpler category was prerequisite to mastery of the next more complex one (Krathwohl 2002, p.213).

Objectives

The main objectives of preparing a review article about revised Bloom's taxonomy are as follows:

- To analyze the book "A taxonomy for teaching, learning and assessing" critically with strength and weaknesses aspects.
- To identify the implications of the taxonomy book.
    - To Recommend the suggestions for further writing taxonomy book.

Methodology

While reviewing the book, systematic approach was applied to critically evaluate 'Revised Bloom's Taxonomy: A Taxonomy for Teaching, Learning, and Assessing' by Lorin W. Anderson and David R. Krathwohl. The process was included content analysis, thematic analysis, and comparative evaluation to ensure a comprehensive review. Criteria for comparison included the comprehensiveness of the frameworks presented, practical applications, and alignment with current school curriculum, pedagogy and assessment.

Major Revisions and Findings of the Taxonomy

The original taxonomy categorized educational objectives into six cognitive domains: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. However, this model was often viewed as static, rigid and overly simplistic. This revision was undertaken by a group of cognitive psychologists, curriculum theorists, and instructional researchers led by Lorin Anderson, a former student of Bloom, and David Krathwohl, one of the original authors. The revised taxonomy made significant changes to the original framework to reflect more current understandings of educational processes and to make it more relevant for the modern educational context. Major revision of the revised Bloom's taxonomy is given below:

Structural Changes

One of the most significant changes in the revised taxonomy is the shift from a static hierarchy of nouns to a dynamic framework of verbs, reflecting the active nature of cognitive processes. This shift underscores the importance of what learners do with knowledge rather than the mere possession of knowledge. Original taxonomy is one dimensional but revised Bloom's taxonomy is two dimensional. This is the major revision and is given below:

Table 1

Knowledge and Cognitive Dimensions

Knowledge Dimensions	**Cognitive Dimensions**
Types: 1. Factual Knowledge 1.1 Knowledge of terminology 1.2 Knowledge of specific details and elements 2 Conceptual Knowledge: 2.1 Knowledge of classifications and categories 2.2 Knowledge of principles and generalizations 2.3 Knowledge of theories, models, and structures 3 Procedural Knowledge 3.1 Knowledge of subject-specific skills and algorithms 3.2 Knowledge of subject-specific techniques and methods 3.3 Knowledge of criteria for determining when to use appropriate procedures 4 Metacognitive Knowledge 4.1 Strategic knowledge	Levels: 1. Remember 1.1Recognizing: identifying 1.2Recalling/retrieving 2 Understand 2.1Interpreting: clarifying/paraphrasing/translating/representing 2.2Exemplifying: illustrating/instantiating 2.3Classifying: categorizing/subsuming 2.4Summarizing: abstracting/generalizing 2.5Inferring: concluding/extrapolating/interpolating/predicting 2.6Comparing: contrasting/mapping/matching 2.7Explaining 3 Apply 3.1Executing: carrying out

4.2 Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge 4.3 Self-knowledge	3.2Implementing: using 4 Analyze 4.1 Differentiating: distinguishing/discriminating/focusing/selecting 4.2 Organizing: finding/coherence/integrating/outlining/structuring 4.3 Attributing: deconstructing 5 Evaluate 5.1 Checking: monitoring/testing 5.2 Critiquing: judging 6 Create 6.1 Generating: hypothesizing 6.2 Planning: designing 6.3 Producing: constructing

Revisit Synthesis

In the revised taxonomy of cognitive level, "Synthesis" was renamed to "Creating" and moved to the highest level of the hierarchy, reflecting the understanding that creation involves higher-order thinking processes than evaluation.

Emphasis on Metacognition

The inclusion of metacognitive knowledge (awareness and understanding of one's own thought processes) reflects an increased recognition of its importance in learning. The inclusion of metacognitive knowledge highlights the importance of students being aware of their own learning processes. This addition reflects an understanding that self-awareness and regulation of learning are critical for effective learning.

Hierarchy and Interactivity

While the original taxonomy was strictly hierarchical, the revised version acknowledges that the cognitive processes are not always linear and can be more interactive and adaptable. For example, this taxonomy is action verb oriented, two-dimensional, inclusion of creating as a higher order skill, emphasis on metacognition, more flexible assessment and instruction, alignment with modern educational goals.

Implications of Revised Bloom's Taxonomy Curriculum Development

The revised taxonomy serves as a valuable tool for curriculum development by offering a structured framework to define competencies, learning objectives, and outcomes, thereby addressing all cognitive and knowledge dimensions. Curriculum alignment involves coordinating three essential components within the classroom: (a) instruction and materials, (b) objectives or standards, and (c) assessments. The premise is that student learning will be most efficient and effective when classroom instruction and materials align with the objectives or standards, which in turn align with the assessments (Gorin & Blanchard, 2004, p. 2).

Anderson (2002, p. 258) proposes that the Taxonomy Table can be a useful framework for estimating curriculum alignment in all subject matters at virtually every grade or school level. By substituting topics with types of knowledge, the Taxonomy Table becomes applicable to all subject areas. Alignment assessments using the Taxonomy Table focus on curriculum units or entire courses rather than individual lessons. The process involves four steps:

1. Each objective is assigned to the appropriate cell(s) in the Taxonomy Table based on the verbs and nouns in the objective statement.
2. Instructional activities and accompanying support materials are placed in the corresponding cells, again using the verbs and nouns for guidance.
3. Each assessment task, whether a performance assessment or test item, is categorized into the appropriate cell based on the descriptive verbs and nouns.
4. The three completed Taxonomy Tables—one each for objectives, instructional activities and materials, and assessments—are then compared for alignment.

Complete alignment is achieved when all three elements occupy the same cell (e.g., understand conceptual knowledge). Partial alignment occurs when the elements align in the same row (type of knowledge) but differ in columns (cognitive process category), or align in the same column but differ in rows. Partial alignment offers diagnostic insights for teachers aiming to enhance curricular alignment. Adjusting an instructional activity to emphasize procedural rather than factual knowledge, or shifting from understanding to analyzing, can significantly improve alignment. The model of taxonomy table is given below:

Table 2

Objectives, instructional activities, and assessment

Knowledge Dimension	Cognitive Dimension					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual knowledge	Activities during teaching of Objective 1					
B. Conceptual knowledge	Objective 1			Activities during teaching of Objective 1		Activities during teaching of

						Objective 4 Assess 4 Elements C, D
C. Procedural Knowledge			Activities during teaching of Objective 4			Objective 4
D. Metacognitive Knowledge		Objective 2 Activities during teaching of objective 2		Activities during teaching of Objective 2 Assess 2	Objective 2	Assess 4 Elements E, F

In the above taxonomy table, the keywords are clarified as the followings:
Objective 1 = Acquire knowledge of a classification scheme of "appeals."
Objective 2 = Check the influences commercials have on students' "senses."
Objective 3 = Evaluate commercials from the standpoint of a set of principles.
Objective 4 = Create a commercial that reflects understandings of how commercials are designed to influence people.
Assess 1 = Classroom exercise-classifying and exemplifying.
Assess 2 =' "Higher-order" classroom questions.
Assess 3 = Commercials on videotapes.
Assess 4 = Scoring guide.

Dark shading indicates the strongest alignment---an objective, an instructional activity, and an assessment are all present in the same cell and Lighter shading indicates two of the three are present (Anderson & Krathwohl, 2001, p.129).

For designing a curriculum, educators can use the revised taxonomy to ensure that learning objectives progress from basic knowledge recall to HOTS. By incorporating each level of the taxonomy, teachers can create a comprehensive curriculum that promotes deep learning and critical thinking by using the above taxonomy table.

Pedagogy

Revised Bloom's Taxonomy is an essential framework in education, aiding teachers in designing curriculum, planning lessons, and assessing student learning. Teachers can use the taxonomy to plan and deliver lessons that promote higher-order thinking skills, encouraging students to move beyond mere memorization to application, analysis, evaluation, and creation. It can be used to classify the

instructional and learning activities used to achieve the objectives, as well as the assessments employed to determine how well the objectives were mastered by the students (Krathwohl, 2002, p. 217)). The revised taxonomy shifts the focus from a static classification of educational objectives to a more dynamic conception of how students learn. It introduces new categories and emphasizes the active processes involved in learning. This hierarchical structure helps educators identify and classify educational goals, objectives, and standards. Lesson planning using the revised taxonomy involves setting clear learning objectives that correspond to different cognitive levels. Teachers can structure their lessons to gradually build students' skills from simple to complex. For example, in the different parts of plant and their function lesson:

Remembering: Students identify the main parts of plant.

Understanding: Students explain the role of roots in nutrient and water absorption.

Applying: Students demonstrate how water moves from roots to leaves using a simple experiment.

Analyzing: Students Analyze the relationship between leaf structure and photosynthetic efficiency.

Evaluating: Students Critique the adaptation of different plant parts to specific environments (e.g., cacti in deserts).

Creating: Students Create an experiment to test the impact of varying light conditions on photosynthesis.

By structuring lessons this way, teachers ensure that students not only acquire knowledge but also understand, apply, analyze, evaluate, and create based on what they have learned.

Revised Bloom's Taxonomy encourages active learning and student engagement by promoting higher-order thinking skills. Teachers can design activities that require students to interact with the material in various ways, fostering a deeper understanding and greater retention of knowledge.

For example, group projects can involve:

Remembering: Collecting and sharing information on a topic.

Understanding: Discussing and explaining concepts to peers.

Applying: Implementing ideas in practical tasks.

Analyzing: Examining different perspectives and identifying patterns.

Evaluating: Debating the merits of different approaches.

Creating: Developing a final project that synthesizes group findings.

This collaborative approach not only builds cognitive skills but also enhances communication, teamwork, and problem-solving abilities. This taxonomy encourages deeper engagement with material through varied cognitive processes and promotes development of higher-order thinking skills.

Assessment

Assessment using the revised taxonomy involves creating tasks and questions that target different cognitive levels. This approach ensures that assessments are comprehensive and can accurately measure students' understanding and skills. For example, in classification of vertebrate assessment:

- **Remembering**: List two examples of Reptilia.
- **Understanding**: Explain the differences between cold-blooded and warm-blooded animals, and classify Pisces, Amphibia, Reptilia, Aves, and Mammalia accordingly.
- **Applying**: Construct a flowchart that can be used to classify an unknown vertebrate into one of the five major classes. Include key decision points based on observable characteristics.
- **Analyzing**: Analyze the evolutionary adaptations of Aves and Mammalia that allow for flight and high metabolism, respectively.
- **Evaluating**: Assess the role of Aves in different ecosystems and their importance in biodiversity.
- **Creating**: Design a poster or digital presentation illustrating the evolutionary timeline and key adaptations of the five classes of vertebrata.

Using the revised taxonomy for assessment helps teachers identify students' strengths and areas for improvement, guiding instruction and providing targeted support. So the revised Bloom's taxonomy provides a framework for developing assessments that measure a range of cognitive skills and helps in creating more comprehensive evaluations of student learning outcomes.

By embracing these revisions, educators can enhance their teaching strategies, create more effective learning experiences, and develop assessments that truly measure student understanding and abilities across a broad spectrum of cognitive skills.

Criticisms of Revised Bloom's Taxonomy

Revised Bloom's taxonomy is very useful for developing curriculum, teaching learning (pedagogy) and assessment. Although, it has some limitation and criticisms. The taxonomy may not fully account for cultural differences in learning styles and educational goals, and its application may be challenging in interdisciplinary contexts where knowledge categories overlap. Some of the limitaton, weaknesses and criticisms are can be found as follows:

1. The taxonomy's hierarchical nature can oversimplify the learning process by implying that certain cognitive processes are more complex or valuable than others.
2. Placing cognitive tasks into specific categories can be subjective, and the distinction between categories can sometimes be ambiguous.

3. The taxonomy primarily focuses on the cognitive domain and does not adequately address other important domains of learning, such as the affective and psychomotor domains (Wilson, 2016)
4. There is limited empirical evidence to support the effectiveness of the taxonomy in improving educational outcomes, which questions its practical utility (Mayer, 2002).
5. The structured framework may restrict teachers' flexibility and creativity in designing curricula and assessments tailored to their students' needs (Airasian & Miranda, 2002)
6. The revised taxonomy does not sufficiently address skills crucial for the 21st century, such as digital literacy, collaboration, and critical thinking in complex real-world contexts.
7. Revised Boom's taxonomy has not given the sufficient examples of different subjects' assessment format and generally focuses on science, mathematics, arts, history, social etc.

While Revised Bloom's Taxonomy provides a structured framework for categorizing educational goals, its limitations and criticisms highlight the need for a more flexible, holistic, and empirically supported approach to teaching, learning, and assessment. Integrating insights from various domains and focusing on real-world applicability can help educators better meet the diverse needs of learners in contemporary educational settings.

Suggestions for Revisers for Further Improvement of the Revised Bloom's Taxonomy

Revised Bloom's taxonomy is very useful in curriculum development, pedagogy and assessment. Although it has some limitations and criticisms. To incorporate the weaknesses and criticism it should be better to include the following suggestions:

1. While the two-dimensional framework provides a comprehensive approach, its complexity can be a barrier. For this, it is necessary to provide clearer, more straightforward guidelines and examples for each category to minimize ambiguity in classification.
2. For implementing effectively, it is necessary to create practical tools and templates that educators can use directly in their lesson planning and assessments and these should include step-by-step instructions and examples.
3. Today's epoch is digital technology and it is necessary to address the 21st century skills, so it is necessary to incorporate integrating technology into the taxonomy framework which includes digital tools that can assist in teaching, learning, and assessing various cognitive processes and knowledge types.

4. Revised Bloom's emphasis on cognitive and knowledge dimensions, so it is necessary to address integrated approach that includes affective (emotional/attitudinal) and psychomotor (physical skills) domains.
5. For ensuring the taxonomy is adaptable to diverse educational settings and cultures, it should provide guidelines for modifying the taxonomy to better suit local contexts and educational practices.
6. Revised Bloom's taxonomy has not addressed the interdisciplinary learning, so, it should be incorporated the guidelines and examples for applying the taxonomy to interdisciplinary and integrative learning experiences. This can help educators design curricula that reflect the interconnected nature of knowledge.
7. Reflective learning is one of the most important approaches, so, it is necessary to provide tools and resources that encourage educators to engage in reflective practice. This can include self-assessment checklists, reflective journals, and peer feedback mechanisms.
8. Revised Bloom's taxonomy is seen as weak in alignment, so, it is necessary to clarify the detailed examples of how to align assessments with the taxonomy. This may help for creating assessments that accurately measure higher-order cognitive processes and different types of knowledge.

By implementing these suggestions and recommendations, the revisers of Bloom's Taxonomy can enhance its usability, relevance, and effectiveness in contemporary educational settings, ultimately leading to improved teaching practices, learning outcomes and assessment mechanism.

Conclusion

Anderson and Krathwohl’s revision of Bloom's Taxonomy offers a more comprehensive and adaptable framework for categorizing educational objectives. By emphasizing cognitive processes and knowledge types, the revised taxonomy supports more effective teaching, learning, and assessment practices. One of the major strengths of the revised taxonomy is its practical applicability in curriculum design. Educators can use this tool to structure their courses and assessments more effectively, ensuring that learning activities target various cognitive levels and types of knowledge. It places a stronger emphasis on higher-order thinking skills, such as analyzing, evaluating, and creating. This shift aligns with contemporary educational goals that prioritize critical thinking and problem-solving abilities, essential for success in the 21st century. Complexity, ambiguity in classification, overemphasis on cognitive domain, practicability, lack of robust empirical evidence, cultural and contextual bias, inflexibility in application are some of the limitation and criticisms in revised Bloom's taxonomy. Despite its criticisms and limitations, the taxonomy remains a valuable tool for educators seeking to enhance student learning and

achievement. The taxonomy significantly influences assessment practices by providing a structured approach to designing evaluations that accurately measure students' understanding and cognitive abilities across different domains. The taxonomy's applicability extends across various disciplines and educational levels, making it a versatile tool for a wide range of teaching and learning contexts. By encouraging educators to reflect on their instructional strategies and objectives, the revised taxonomy promotes a more thoughtful and deliberate approach to teaching. This reflective practice helps in continuously improving educational outcomes. The taxonomy aligns well with national and international educational standards, providing a robust framework that supports the alignment of curriculum, instruction, and assessment with established educational benchmarks. The book serves as a valuable resource for professional development, offering insights and strategies that educators can use to enhance their teaching practices.

In summary, "Revised Bloom's Taxonomy: A Taxonomy for Teaching, Learning, and Assessing" offers a sophisticated yet practical framework for modern education. Its emphasis on higher-order thinking, detailed structure, and broad applicability makes it an essential tool for educators aiming to improve their teaching and assessment strategies. The book not only advances theoretical understanding but also provides practical guidance that can be readily implemented in diverse educational settings.

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