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Development of Cognitive Skills in the Field of Education

Nebue Mpanya Marceline*

Head of work, University of Kabinda, RD Congo
*Corresponding author: nebuemarceline@gmail.com

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Abstract This article examines the trends, challenges, and opportunities related to the development of cognitive skills in the field of education. Based on a critical analysis of the above discussions, it explores the predominance of knowledge and comprehension levels, the lack of representation of higher cognitive levels, the variability between disciplines, and the importance of application and critical thinking. The article highlights current gaps in teaching and evaluation methods, emphasizing the need for a shift towards more advanced cognitive skills. It also discusses the implications for educational practice and the necessity for educators to adopt strategies that foster critical thinking, problem-solving, and practical application of knowledge. Drawing on recent research and concrete examples, the article proposes recommendations for a more integrative educational approach that focuses on the holistic development of cognitive skills, ensuring students are well-prepared for the complexities of the modern world. By advocating for innovative pedagogical practices and continuous teacher training, the article underscores the importance of collaboration among educators, policymakers, parents, and communities in transforming education to meet the demands of the 21st century.

Keywords: *education, cognitive skills, evaluation, bloom's taxonomy, critical thinking*

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1. Introduction

1.1. Problematic and Study Objectives

Contemporary education faces unprecedented challenges, particularly concerning the development of learners' cognitive skills. In this introduction, we will examine the theoretical and methodological framework of our study by highlighting the crucial issues related to this development in the current educational context.

In a constantly evolving world, individuals' ability to think critically, solve complex problems, and adapt to a changing environment is essential. However, many educational systems continue to disproportionately focus on acquiring factual knowledge at the expense of developing advanced cognitive skills.

The objective of our article is to analyze the trends, gaps, and opportunities related to the development of cognitive skills in contemporary education. We will look into the predominance of knowledge and comprehension levels, the lack of representation of higher levels, the variability between disciplines, and the importance of application and critical thinking.

By highlighting these aspects, we aim to identify the challenges faced by education today and the ways forward to promote more meaningful and holistic learning. Our goal is to inspire critical reflection and propose practical recommendations to improve educational practices to meet the needs of 21st-century learners.

The organization of our discussion will be structured around the analysis of observed trends, the variability between disciplines, the lack of application and critical thinking, and recommendations for a more integrative approach to the development of cognitive skills in the educational context. By exploring these dimensions, we hope to contribute to an enriching dialogue on the future of education and learning.

1.2. Literature Review

Previous studies examining the adherence to Bloom's taxonomic levels in assessing students' cognitive skills provide enriching perspectives on the design and evaluation of learning objectives.

Crowe, Dirks, & Wenderoth [1] explored that the application of Bloom's taxonomic levels in teaching and assessing cognitive skills in biology. The authors highlight how Bloom's taxonomy can enhance learning by providing clear objectives and fostering deep conceptual understanding. The Churches ‘study [2] focused on adapting Bloom's taxonomy to the digital context. The author presents the concept of "Bloom's Digital Taxonomy" and proposes strategies to effectively integrate technology into teaching and assessing cognitive skills.

Armstrong, An, Gardiner, & Hunter [3] examined the development and evaluation of an innovative tool for online formative assessment of text quality, based on Bloom's taxonomy. The authors explore how this tool can be used to assess students' cognitive skills in written text production. Korucu & Alkan [4] compare constructivist and traditional learning environments concerning student motivation. Although the focus is not exclusively on Bloom's taxonomy, the study examines how these environments influence students' cognitive skills. Krathwohl [5] provides an overview of the revision of Bloom's taxonomy, emphasizing its importance in designing effective learning objectives, assessments, and educational programs.

These studies underline the importance of Bloom's taxonomy in designing learning objectives and assessments, offering essential insights for improving educational practices.

Research on assessment practices in educational systems plays a crucial role in effectively measuring advanced cognitive skills, such as critical thinking and problem-solving. These studies examine various types of assessments, including standardized tests, formative and summative assessments, peer assessments, and learning portfolios. The validity and reliability of assessment methods are evaluated to ensure they accurately measure the targeted cognitive skills, while emphasizing the importance of alignment between learning objectives, teaching methods, and assessment methods.

Stiggins, Arter, Chappuis, and Chappuis [6] explored assessment practices, focusing on formative assessments and their integration into teaching. Wiggins and McTighe [7] propose a framework for designing curricula based on clear learning objectives and assessments aligned with these objectives. Popham [8] examines the fundamental principles of classroom assessment, emphasizing authentic assessments and the use of assessment data to improve teaching and learning. Black and Wiliam [9] highlight the importance of formative assessment in improving student outcomes and provide examples of effective assessment practices. Brookhart [10] explores strategies for assessing higher-order cognitive skills within teaching and learning contexts.

Longitudinal studies on learning play a crucial role in understanding the evolution of cognitive skills throughout life. They follow individuals over an extended period, allowing for the measurement of cognitive skills at different development stages and identifying factors influencing this process. Measurement methods include standardized tests and classroom observations.

These studies examine cognitive development trajectories, environmental factors, and long-term outcomes such as academic and professional success. They inform educational practices by highlighting effective strategies to promote cognitive development.

Cognitive skill development begins in early childhood and is influenced by formal education, developmental stages, and lifelong learning. The learning environment, brain plasticity, and social interactions are key elements of this dynamic and continuous process.

A significant longitudinal study conducted by Barnett et al. [11] examined the impact of preschool programs on children's cognitive development. The results showed that children benefiting from high-quality preschool programs exhibited significant improvements in several cognitive domains throughout their schooling. This research illustrates the importance of longitudinal studies in assessing the long-term effects of educational interventions.

Cognitive skills evolve throughout life, and longitudinal studies offer valuable insights into this process. They help understand the impact of educational interventions and guide educational policies and practices.

1.3. Conceptual and Theoretical Overview

1.3.1. Cognitive Skills

Cognitive skills, explored by researchers in cognitive psychology and education, represent a vast field studied from various perspectives. Critical thinking, information processing, problem-solving, socio-cultural reasoning, and complex thinking are theories that provide diverse insights into the nature of these skills.

Edgar Morin's principles of complex thinking [12] can be applied to education to enhance teaching and learning processes. Here's how: (i) *Dialogical Principle*: This principle suggests integrating seemingly opposing ideas to create a more comprehensive understanding. In education, this can be applied by encouraging students to explore and reconcile different perspectives. For example, teaching can incorporate debates and discussions that juxtapose contrasting viewpoints, helping students understand that reality often involves the coexistence of opposing elements. (ii) *Principle of Organizational Recursivity*: This principle highlights the idea of self-organization and self-production. In educational contexts, this can translate to fostering environments where students are both the creators and beneficiaries of the learning process. For instance, project-based learning allows students to take initiative, organize their work, and learn through the process of creating something meaningful. This approach emphasizes the cyclical nature of learning, where students' outputs influence their subsequent learning inputs. (iii) *Hologramatic Principle*: This principle states that parts reflect the whole, and the whole is present in each part. In education, this can be applied by showing how individual learning experiences contribute to a broader understanding and how the curriculum is interrelated. For example, interdisciplinary teaching can demonstrate how concepts from one subject are relevant and applicable to another, highlighting the interconnectedness of knowledge. Additionally, recognizing that each student’s learning journey reflects and contributes to the overall classroom dynamic can help educators tailor their approaches to meet diverse needs.

The theory of critical thinking, developed by Richard Paul and Linda Elder [13], emphasizes the analysis, synthesis, and evaluation of information. David H. Jonassen et al. [14] propose a theory of problem-solving, highlighting the ability to break down complex problems and evaluate solutions. For Lev Vygotsky (cited by Laval, [15]), reasoning and problem-solving emerge from social and cultural interactions.

In education, one must recognize and reaffirm the pioneering nature of Piaget's complex thinking. More recently, as reported by Fiedler-Ferrara [12], some authors have attempted to construct curricula and methodologies that enable the transition from simple to complex thinking.

From an epistemological perspective [12], complex thinking is characterized by three key attitudes: the emphasis on rigorous theoretical efforts to counteract prevailing empiricism and eclecticism in research; the necessity of inventing new discursive and conceptual objects; and a constructivist approach that encourages conceptual imagination over positivism. Additionally, it involves reintegrating knowledge production within society to avoid excessively abstract epistemology detached from sociology and the history of science.

These theories highlight the complexity of mental processes involved in cognitive skills. They underscore the importance of understanding diverse perspectives to inform educational practices and personal development. By understanding the different aspects of human thought, educators can design teaching and learning programs that promote the holistic development of individuals.

Understanding cognitive skills is essential for improving educational practices. By exploring these different theories, researchers and educators can better grasp the complex nature of human thought and contribute to forming individuals capable of solving everyday challenges and adapting to a constantly evolving world.

1.3.2. Education and Evaluation

Education and evaluation are closely linked in the learning process, as emphasized by De Ketele [16]. Evaluation plays a crucial role in providing information on learners' progress, identifying areas needing improvement, and guiding pedagogical decisions.

According to De Ketele [16], evaluating involves examining the degree of adequacy between a set of information and pre-established criteria to make a decision. Evaluations provide a measure of learners' progress against set learning objectives, as highlighted by Roegiers [17]. They also provide constructive feedback to learners on their performance, helping to identify areas for improvement, as mentioned by De Ketele [16].

Teachers, as noted by Talbot [18], use evaluation results to adjust their teaching methods and pedagogical strategies according to learners' specific needs, revising content and adapting learning activities if necessary.

Assessment data are crucial for guiding the revision and development of school programs, thereby contributing to improving student learning outcomes. They also serve to evaluate the overall quality of teaching and school programs, fostering accountability and continuous improvement within educational systems.

Evaluation is an indispensable element of the educational process, providing crucial information to guide learners' learning, improve teaching, and inform policy and curriculum decisions. Evaluation practices, integrated into the teaching-learning process, have evolved over decades to inform and regulate pedagogical and didactic activities in real-time, as highlighted by Barbier [19].

Bloom, Madaus, and Hastings [20] have presented a comprehensive overview of evaluation typologies, which categorize different approaches to assessing various aspects of education. These typologies serve as frameworks for understanding the purposes, methods, and outcomes of evaluations in educational contexts.

Table 1. Evaluation typologies

Evaluation typology	Diagnostic evaluation	Formative evaluation	Summative evaluation
Goals and roles	Identify learners' prerequisites and needs. Determine causes of learning difficulties. Guide placement decisions and pedagogical interventions.	Improve teaching and ongoing learning. Provide feedback and corrective measures to struggling learners.	Rank, certify, and attest to learners' progress. Determine the extent to which learning objectives have been achieved.
Timing	At the beginning of a teaching sequence to determine learners' readiness levels.	Throughout teaching activities to identify persistent difficulties.	At the end of a teaching sequence or program, once learning is complete.
Feedback type	Identifies prerequisites, needs, and learning difficulties of learners. Provides information for adjusting pedagogical interventions.	Provides feedback on ongoing performance and guides learning. Offers recommendations for improving skills.	Provides a judgment on learners' final performance. Assesses achievement of learning objectives.
Participants involved	Teachers, educational counselors, learners.	Teachers, learners.	Teachers, program administrators, learners.
Main function	Assess prerequisites, needs, and learning difficulties.	Improve ongoing teaching and learning.	Evaluate final performance and attest to progress.
Links between types	Precedes formative evaluation by identifying needs and prerequisites.	Complements diagnostic evaluation by providing continuous feedback.	Concludes the learning process by evaluating final performance.

Source: Bloom, Madaus, and Hastings [21] These evaluation typologies highlight the importance of each type of evaluation in the teaching and learning process, along with their specific objectives and distinct roles.

1.3.3. Bloom's Taxonomy

In 1956, Dr. Benjamin Bloom [21,22], an educational psychologist, in collaboration with Max Englehart, Edward Furst, Walter Hill and David Krathwohlput forward a theory to upgrade the teaching learning process from the lower level of rote-learning and memorization to the higher level of analysis, evaluation, creativity and problem-solving approach. It includes three domains: cognitive (knowledge), affective (attitudes), and psychomotor (skills). The cognitive domain originally had six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.

Bloom's Taxonomy provides a useful framework for structuring the teaching and assessment of cognitive skills. Each level of the taxonomy corresponds to specific types of cognitive skills and can be used to formulate clear and measurable learning objectives.

For example, the "knowledge" and "comprehension" levels of Bloom's Taxonomy focus on mastering facts, concepts, and basic ideas, while the "synthesis" and "evaluation" levels involve more advanced skills such as creating new ideas, critical evaluation, and solving complex problems.

By using Bloom's Taxonomy as a guide, teachers can design assessments that reflect specific learning objectives and effectively measure students' cognitive skills at different levels of complexity. This also ensures that assessments are balanced and cover a wide range of cognitive skills, contributing to a more comprehensive and fair evaluation process.

Here is a table that presents the six levels of Bloom's Taxonomy with their corresponding descriptions.

Table 2. Bloom's Taxonomy

Level	Description of questions to compose	Typical examples
1. Knowledge	Recall of facts and concepts, integrated into real contexts or scenarios for deeper understanding.	What is...? Who did...? Where is...? When did...? Can you name...?
2. Comprehension	Explanation of concepts, identification of patterns or relationships, application of knowledge in new or concrete situations.	Can you give an example of...? Can you explain in your own words...? Can you summarize...? What is implied...?
3. Application	Solving practical problems, making informed decisions, executing specific tasks, with multidisciplinary scenarios.	Can you clarify...? How would you use...? Can you demonstrate...? Can you apply...?
4. Analysis	Examining relationships between concepts, identifying parts of a whole, evaluating arguments, breaking down complex problems.	What problems could you solve...? Can you identify the parts of...? What are the relationships between...?
5. Synthesis	Creating new ideas by combining information from different sources, through research projects, creative presentations, or innovative solutions.	Can you differentiate between...? Can you propose an original solution to...? How would you combine...?
6. Evaluation	Judging the validity of information, evaluating arguments or theories, drawing conclusions based on objective criteria, defending viewpoints.	Can you invent...? What alternatives...? What evidence supports...? How would you critique...? What are the consequences of...? What is the best criterion to evaluate...?

Source: Bloom, Madaus, and Hastings [20] This table summarizes the different levels of cognitive skills as established in Bloom's Taxonomy. Each level represents an increasing degree of complexity in how learners interact with information and demonstrate their understanding.

1.3.4. Critical Thinking

The development of critical thinking is at the heart of educational sciences, both in teacher training and pedagogical practices. Future educators are encouraged to question preconceived ideas and adopt a reflective approach. Similarly, educators strive to promote critical thinking among their students by encouraging them to ask questions and analyze arguments. Educational sciences also emphasize the development of research skills and the critical evaluation of academic literature.

In this context, researchers in educational sciences critically examine educational policies, assessing their impact on teaching practices and student outcomes. They identify the strengths and weaknesses of existing policies and propose recommendations for more effective educational reforms. Continuous professional development is also crucial, involving critical reflection on practice and the exploration of new ideas.

By cultivating critical thinking in educators, students, and researchers, educational sciences contribute to promoting a more thoughtful, analytical, and informed approach to education. This fosters more effective, innovative, and equitable educational practices that meet the needs of learners and society.

Simultaneously, academic research explores various methods for teaching critical thinking in the classroom. It highlights effective practices such as Socratic questioning, classroom discussions, and case studies. Researchers also strive to develop reliable assessment methods to measure students' critical thinking skills, despite challenges such as students' resistance to questioning their beliefs.

The works of Facione [23], Ennis [24], Halpern [25], Brookfield [26], and Scriven and Paul [27] have played a crucial role in the theoretical and practical foundation of teaching critical thinking. Their contributions offer valuable perspectives for researchers and practitioners in education, guiding research and educational practices toward a more thoughtful and enlightened future.

2. Methodology

To conduct our study thoroughly, we opted for a survey method that allowed us to obtain precise information and reliable data. Our research was conducted in the educational province of Lomami, specifically in the city of Kabinda. This method allowed us to visit the field where we had direct contact with teachers providing psycho-pedagogical courses in the following schools: Institut Kabinda I, Kabinda II, Lomami, Du 16 juin, Kamukungu, Kishi, Mukungila, Muamba Akepusha, Bilonda in Lubatshi, and Kabanda in Zewe, over a school period of 3 years (2018-2019, 2019-2020, 2020-2021).

We examined the teachers' composition books, quiz books, and student exam papers from the mentioned schools to analyze their various methods of formulating assessment questions. Our goal was to verify if these questions adhered to the problem-based approach criteria and accounted for all the taxonomic levels of B.S. Bloom, namely the levels of knowledge, comprehension, application, analysis, synthesis, and finally judgment and evaluation.

To collect the data, we used the documentary technique, which allowed us to view, read, and analyze the teachers' assessment questions. This method was justified by the fact that it was the only way to access the data from the teachers' composition books, quizzes, and student exam papers.

Our study focused on a population of 8 teachers from 4 mentioned schools, with two teachers per institute, providing psycho-pedagogical courses in the first (3rd HP), second (4th HP), third (5th HP), and fourth (6th HP) grades. Given the limited number of surveyed teachers, we deemed it necessary to work with the 8 subjects as samples.

3. Study Results

The Table 3 presents the results of the different taxonomic levels of cognitive questions according to Bloom's classification, based on specific disciplines and levels of study:

Table 3. Taxonomic levels of cognitive questions according to Bloom by discipline and level of study

Level of Knowledge	Discipline and level of study	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Pedagogy	3rd HP	25.49	68.63	0	5.88	0	0
	4th HP	39.29	57.14	0	3.57	0	0
	5th HP	66.67	33.33	0	0	0	0
	6th HP	29.49	67.95	1.28	1.28	0	0
Psychology	3rd HP	34.78	65.22	0	0	0	0
	4th HP	30	70	0	0	0	0
	5th HP	65.22	30.44	0	0	0	4.35
General didactics	4th HP	40.91	59.09	0	0	0	0
	5th HP	35.07	54.55	0	10.39	0	0
Specialized didactics	4th HP	35.9	61.54	0	2.56	0	0
Total		36.98	59.12	0.24	3.41	0	0.24

Table 4. Taxonomic levels of cognitive questions according to Bloom by study level

Study level	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
3rd HP	29.9	67.01	0	3.09	0	0
4th HP	36.7	61.47	0	1.83	0	0
5th HP	47.24	45.67	0	6.3	0	0.79
6th HP	29.49	67.95	1.28	1.28	0	0
Total	36.98	59.12	0.24	3.41	0	0.24

Table 5. Taxonomic levels of cognitive questions according to Bloom by discipline

Discipline	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Pedagogy	35.33	61.41	0.54	2.72	0	0
Psychology	41.57	57.30	0	0	0	1.12
General Didactics	36.36	55.56	0	8.08	0	0
Specialized Didactics	35.90	61.54	0	2.56	0	0
Total	36.98	59.12	0.24	3.41	0	0.24

The total for all disciplines and levels of study shows a predominance of knowledge (1.0) and comprehension (2.0) levels. Other taxonomic levels (application, analysis, synthesis, evaluation) have lower contributions, sometimes even null in certain cases. The analysis (4.0) and evaluation (6.0) levels have some presence in certain combinations of disciplines and study levels. Application (3.0) and synthesis (5.0) levels are less represented.

The Table 4 presents the results of the different taxonomic levels of cognitive questions according to Bloom's classification, based on various study levels from the 3rd to the 6th year in general pedagogy.

The total for all study levels shows a similar trend across different levels, with a predominance of knowledge and comprehension levels, representing 36.98% and 59.12% respectively. Other taxonomic levels (application, analysis, synthesis, evaluation) contribute less significantly. Knowledge and comprehension levels seem to be the most common across the specific study levels mentioned.

The Table 5 presents the results of the different taxonomic levels of cognitive questions according to Bloom's classification, distributed by the disciplines of pedagogy, psychology, general didactics, and specialized didactics.

The total for all disciplines shows a predominance of knowledge and comprehension levels, with percentages of 36.98% and 59.12% respectively. Other taxonomic levels (application, analysis, synthesis, evaluation) contribute less significantly. In general didactics, analysis is more pronounced compared to other disciplines, while in psychology, evaluation is slightly higher than in other disciplines.

4. Discussion of Results

Education is the foundation of human progress, transmitting knowledge and developing skills to succeed in a constantly evolving world. Faced with unprecedented challenges related to the rapid evolution of society and technologies, modern education focuses on developing critical thinking, creativity, and problem-solving. Technological advances, such as online learning and virtual reality, are transforming teaching and making learning more accessible and personalized. However, persistent inequalities in access to education, socio-economic disparities, and gaps in teaching quality remain global challenges. Rethinking success indicators and adopting inclusive approaches are crucial aspects for evaluating the effectiveness of educational systems in a changing world.

4.1. Taxonomic Levels of Cognitive Questions According to Bloom by Discipline and Level of Study

The distribution of taxonomic levels of cognitive questions according to Bloom's taxonomy across disciplines and study levels reveals several aspects that warrant criticism. Firstly, there is a predominance of knowledge and comprehension levels in most disciplines and study levels. This trend indicates a focus on memorization of facts and understanding of concepts at the expense of developing higher-order skills such as critical analysis, synthesis, and evaluation.

Indeed, the underrepresentation of higher levels, such as application, analysis, synthesis, and evaluation, in many fields of study suggests a lack of emphasis on the development of advanced cognitive skills necessary for solving complex problems, making informed decisions, and critically evaluating information. As Ardoine and Berger, cited by Barbier [19], note evaluation is generally conducted to manage an action. Evaluating involves defining criteria and indicators to make decisions, thus choosing relevant elements should be what one projects and determines during the action and at its conclusion, whether these elements are present in the reference (what is).

In this regard, Christian Kabongo Malonda [28], in developing his research theme on "the problem of formulating operational objectives in primary school awakening lessons," explains in his interpretation of the results that teachers poorly assess students because, according to him, teachers' evaluation questions do not consider the operational objectives set in the lessons. This also relates to the objective-based pedagogy (PPO) described in our first chapter.

This situation necessitates a revision of pedagogical practices and the promotion of the development of advanced cognitive skills. It is crucial for educators to design pedagogical strategies that encourage the acquisition of higher-order skills, such as using active teaching methods that promote the application of knowledge in real-world contexts and formulating open-ended questions that stimulate analysis and critical reflection.

Furthermore, the variability between disciplines and study levels concerning the distribution of taxonomic levels raises challenges for ensuring balanced development of cognitive skills across different fields. To address this, it would be beneficial to promote collaboration among educators and draw inspiration from best practices in other fields.

Moreover, the lack of development of critical and analytical skills is a major concern. These skills are essential for independent thinking, problem-solving, and informed decision-making. Educators must integrate pedagogical activities that foster the development of these skills from an early age and maintain them throughout the educational journey.

Brigitte Petit Jean [29] observed that in common practice corresponding to the traditional pedagogical model, evaluation is confused with punctual, normative control, most often written, aimed at verifying cognitive achievements without considering the student's affective dimension—"their level of involvement in the task, their learning approach...". This evaluation, which aims to classify and select, results in punitive grading that does not always make its criteria explicit.

Thus, in our study, the distribution of taxonomic levels of cognitive questions according to Bloom highlights gaps in the pedagogical approach and evaluation of learning. To foster deeper and more holistic learning, it is necessary to reevaluate pedagogical practices and promote the development of advanced cognitive skills at all study levels and across all disciplines.

4.2. Taxonomic Levels of Cognitive Questions According to Bloom by Study Level

The distribution of taxonomic levels of cognitive questions according to Bloom's taxonomy by study level highlights several points for critique.

Firstly, there is a predominance of knowledge and comprehension levels across all study levels. This trend suggests an excessive focus on memorization of facts and superficial understanding of concepts, at the expense of developing higher-order skills such as critical analysis, synthesis, and evaluation. To address this, educators must adopt pedagogical approaches that encourage the development of more advanced cognitive skills, such as exploration, problem-solving, and critical reflection.

Secondly, there is a low representation of higher levels, such as application, analysis, synthesis, and evaluation, across all study levels. This suggests a lack of emphasis on the development of advanced cognitive skills necessary for solving complex problems and making informed decisions. To remedy this gap, educators need to design curricula and teaching methods that foster the development of higher-order skills.

An important observation is the variability of taxonomic levels across different study levels. This variation may be due to differences in curricula, teaching methods, and learning objectives specific to each level. It is crucial for educators to understand this variability and adapt their approaches to meet the needs and capabilities of students at each level.

Lastly, there is a lack of application and critical thinking, notably an almost complete absence of application levels in certain study levels. The application of knowledge is essential for solving real-world problems, and critical thinking is crucial for evaluating information critically. To bridge these gaps, educators must actively encourage the development of these skills throughout the educational journey.

Kupelesa Edumbe Omadeke [30] argued that the evaluation of learning is often overestimated. In his analysis of the evaluation practices of secondary school teachers in summative decisions for student certification, Baribeau [31] found that teachers' evaluation practices are constrained by multiple factors. There are several limitations regarding the new directions for evaluating learning.

The practice of evaluation is one of the most powerful indicators of a teacher's professionalism, which is why teachers cannot afford to make mistakes in evaluation. Too often, the practice of evaluation is reduced to assigning a grade, which alone cannot fulfill the intended function [16].

In our study, the distribution of taxonomic levels of cognitive questions according to Bloom raises significant concerns about the predominance of lower levels and the underrepresentation of higher levels. This underscores the need for a revision of pedagogical practices to promote deeper learning and the development of advanced cognitive skills in students.

4.3. Taxonomic Levels of Cognitive Questions According to Bloom by Discipline

The distribution of taxonomic levels of cognitive questions according to Bloom across different disciplines reveals certain trends and gaps that merit thorough analysis.

Firstly, it is notable that there is a low presence of higher levels of analysis, synthesis, and evaluation across all disciplines. These levels are crucial for developing critical thinking, problem-solving, and information evaluation skills, which are essential for success in both professional and personal life. This observation suggests that pedagogical approaches may prioritize memorization and superficial understanding over reflection and practical application of knowledge. To address this, educators must implement teaching methods that actively promote the development of critical thinking, analysis, and evaluation skills.

Additionally, a lack of diversity in the levels of application is observed across all disciplines. The application of knowledge is crucial for skill transferability and solving real-world problems. Its absence may indicate an imbalance in teaching and evaluation approaches. To mitigate this gap, educators must integrate teaching methods that encourage the practical application of knowledge in real-world contexts, such as case studies, research projects, and internships.

Furthermore, while knowledge and comprehension levels are important, their excessive predominance can lead to an imbalance in education. An overemphasis on the acquisition of facts and concepts can limit students' ability to deeply understand and meaningfully apply their knowledge. To address this issue, it is essential for educators to design curricula and teaching methods that encourage critical reflection, problem-solving, and practical application of knowledge.

Moreover, some disciplines, such as psychology, exhibit a complete absence of higher levels of cognitive skills. This suggests a critical need to review teaching and evaluation methods to promote higher levels of critical thinking and creativity among students.

The observed variability in the distribution of taxonomic levels across different disciplines and study levels reflects the diversity of pedagogical approaches, learning objectives, and academic traditions. Educators must consider the specific characteristics of each discipline and study level when planning courses and developing programs. This requires adapting pedagogical methods to meet the unique needs and demands of each educational context.

Thus, particular attention should be paid to balancing the different cognitive levels to promote comprehensive and holistic learning. Understanding the factors influencing the variability in the distribution of taxonomic levels is essential for designing effective curricula and teaching methods that foster cognitive and academic development in students across all fields and study levels.

The analysis of trends reveals a predominance of knowledge and comprehension levels in contemporary education, leaving higher levels largely underrepresented. This approach favors memorization over reflection and problem-solving. Advanced skills like critical thinking are crucial for professional and personal life. It is imperative that educators adjust curricula and evaluation methods to foster the development of these skills. In summary, the analysis highlights the need for educational reform focused on deeper and more critical learning, prioritizing advanced cognitive skills.

Jacyguara Costa Pinto [32] argued that any instrument used by teachers and schools for evaluation serves as a means to establish learning levels, recognize the best and the worst, and especially adapt teaching to the excellence standards set by the school. Standardized measures have diverted the democratic, critical, constructive, and creative sense of evaluation, preventing the path to effective learning.

The lack of application of knowledge and critical thinking in contemporary education is concerning, often stemming from an approach focused on memorization rather than problem-solving. Students can recall information but struggle to apply it, limiting their adaptability. Critical thinking is also deficient, hindering deep analysis and informed decision-making. These gaps compromise students' preparation for the real world and perpetuate misinformation. To address this, it is essential to integrate more application of knowledge and critical thinking into educational programs, encouraged by active teaching methods.

5. Conclusion

The in-depth study of cognitive skills in the contemporary educational context reveals the urgent need for a substantial reevaluation and transformation of the current educational approach. By highlighting the predominance of knowledge and comprehension levels at the expense of higher-order cognitive skills, it underscores the importance of shifting towards an approach that promotes critical thinking, problem-solving, and practical application of knowledge. The variability between disciplines and study levels also emphasizes the importance of inclusive and equitable education, tailored to the specific needs of each field of study.

Modern education, far beyond the acquisition of knowledge and skills, is a crucial driver of human development, individual autonomy, and collective prosperity. Its transformation must revolve around recognizing the diversity of learning styles and the aspirations of learners, ensuring equitable access to quality education.

21st-century skills such as critical thinking and creativity must be at the core of educational programs to prepare learners to succeed in an ever-changing world. To achieve this, close collaboration among educators, policymakers, parents, and communities is necessary. Pedagogical innovation, continuous teacher training, and stakeholder engagement are essential elements of this transformation.

By recognizing and valuing non-cognitive skills such as resilience and empathy, an integrative educational approach can promote student well-being and personal growth. Finally, promoting an inclusive educational environment that respects diversity is crucial for creating dynamic and stimulating learning environments.

Transforming education requires the commitment and collaboration of all involved stakeholders. By fostering pedagogical innovation, enhancing teacher training, and encouraging stakeholder engagement, we can create educational environments that effectively prepare students to succeed in an ever-evolving world.

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