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(Analysis of Questions in the Mathematics, Scientific, and Technological Education textbook in Second Grade – Second Generation – of Primary Education According to Bloom’s Taxonomy of Cognitive Objectives

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Abstract:

The purpose of the current study was to analyze the questions in the textbook of Mathematics, Scientific, and Technological Education in the second grade of Primary Education, based on the taxonomy of cognitive objectives proposed by Bloom. The content analysis method was used to classify the questions into their corresponding levels of the taxonomy, in order to identify the presence of higher-order and lower-order thinking skills in the textbook. In addition, the distribution of the cognitive objectives of the textbook was analyzed in different units of the textbook. The results revealed a significant inclination towards the presence of lower-order thinking skills, such as application, understanding, and remembering, which constituted (92.1%) of the total questions in the textbook.

keywords: Textbook ; Bloom's Taxonomy.

Introduction:

The textbook is viewed as a cornerstone of the curriculum since it is a set of ideas, concepts, learning activities, and facts through which the learner gets learning experiences, principles, and knowledge (Al-Ghani & Ibn Yahya, 2023, p. 130). It influences their way of thinking and their method of handling scientific and practical problems. It is the main motivator of the learning process. The level of questions included in the textbook decides the ceiling of the learner; it either limits the learner to memorization or encourages them to critical thinking and innovation.

Problem Statement:

In spite of the current educational trends, which emphasize a move away from rote approaches towards the use of learning styles that promote the development of thinking skills, the application of such approaches has identified a disparity between the ideals set out in the introductory sections of the curriculum and the nature of the questions and activities provided for evaluation purposes. In view of the mirror provided by school questions, which reflect the thought processes aimed at for achievement, it becomes necessary to ascertain the balance and completeness of such questions regarding the levels of higher order thinking, such as analysis and creativity, compared to the lower order ones, such as recall, understanding, and application.

Research Questions:

- What is the percentage of lower order thinking levels in the questions of the second-grade mathematics and scientific/technological education textbook?
- What is the percentage of higher order thinking levels in the questions of the same textbook?
- Is there a balance in the distribution of cognitive objective levels among the different units of the book?

Study Objectives:

- Identifying the percentage of lower order thinking levels of the textbook content, such as 'Remembering,' 'Understanding,' and 'Applying.'
- Identifying the percentage of higher order thinking levels of the textbook content, such as 'Analyzing,' 'Evaluating,' and 'Creating.'
- Determining the extent of distribution of cognitive objective levels throughout the units of the textbook.

The importance of the Study:

This study is considered to be of great significance to teachers, educators, and the educational library, as follows:

- Teachers: To draw their attention to the formulation of questions that are more than just lower order, which are aligned with the mental capacity of pupils, while providing a base for future higher order thinking.
- Educators and Curriculum Designers: To provide insight into the actual cognitive objectives of the 'Second Generation' developed textbooks, while providing feedback on the quality of such cognitive objectives.
- Educational Library: To contribute to a scientific methodology for handling qualitative data, while enriching the field study of content analysis.

Operational Definitions:

- **Mathematics and Scientific/Technological Education Book:** An integrated educational document for second-grade primary education, developed according to the "Second Generation" standards and implemented in 2016.

Research Methodology:

The study employs the Content Analysis method, which aims to analyze the manifest content or explicit substance of the studied phenomenon and describe it objectively, systematically, and quantitatively (Sarhan & Al-Mahmoudi, 2019, p. 60).

Study Sample:

The sample consists of the integrated Mathematics and Scientific/Technological Education textbook for the second year of primary education. The book is divided into four learning modules (units), each containing an introductory situation, initial learning situations, an integration station, and an evaluation station.

Study Tool:

The tool used is a **Content Analysis Card** containing six main categories divided into two levels of thinking (Lower and Higher), based on Bloom's Taxonomy:

1- Lower-Order Thinking Skills (LOTS):

- Remembering: Remembering definitions, facts, or laws.
- Understanding: Understanding and interpreting the information (by explaining or comparing).

- Applying: Applying rules or laws in different situations (by calculating or solving).

2- Higher-Order Thinking Skills (HOTS):

- Analyzing: Understanding the information and analyzing relationships.
- Evaluating: Judging or making a decision based on certain standards.
- Creating: Applying previously learned information to come up with new ideas or solutions.

Reliability of Analysis:

The validity of the instrument was proven through the Expert Judgment (Face and Content Validity) method, which is the most appropriate method for the content analysis methodology. The instrument was presented to experts to assess its relevance to the theme and purpose of the study. Experts were given a validation form to tick whether they agree or disagree with the instrument. In addition, they were asked to propose other items in case of disagreement. After obtaining the forms, the experts' suggestions and recommendations were carefully incorporated to improve the final version of the instrument.

Analysis Reliability:

To ensure the **reliability** of the analysis, **Holsti's Equation** was applied. A random sample of **20 questions** was selected from the Mathematics and Scientific & Technological Education textbooks (the study sample) and initially categorized. After a specified period, the same sample was re-categorized (**Test-Retest method**). A minor discrepancy was observed between the first and second analyses, involving only two items.

The reliability coefficient was calculated using the following formula:

$$R = \frac{2M}{C1 + C2}$$

Where:

- **R:** Reliability coefficient.
- **M:** Number of categories agreed upon in both analyses.
- **C1:** Total number of categories analyzed in the first session.
- **C2:** Total number of categories analyzed in the second session. (**Tu'aimah, 2004, p. 226**)

$$R = \frac{2*18}{20+20} = \frac{36}{40} = 0.90$$

Results:

The calculation yielded a reliability coefficient of **0.90**. This value indicates a high level of consistency and is considered highly acceptable within the standards of educational research.

Statistical Methods:

Frequencies and percentages were used, as demanded by the statistical treatment of this kind of research. (Content Analysis)

Presentation, Analysis, and Interpretation of Study Results

- Presentation and Interpretation of the First Research Question:

"What are the levels of Lower-Order Thinking Skills (LOTS) in the questions of the Mathematics and Scientific/Technological Education textbook for the second grade of primary education?"

Table (01): Classification of Questions into Lower-Order Thinking Levels

Lower-Order Thinking Levels	Frequency (f)	Parentage (%)
Remembering	146	25%
Understanding	104	17.7%
Applying	289	49.4%
Total	539	92.1%

According to the data presented in the table, it is observed that the "Applying" level questions ranked first, with the highest frequency of (289) and a corresponding percentage of (49.4%) of the total questions presented in the integrated textbook. The second rank is taken by the questions corresponding to the "Remembering" level, with a frequency of (146) and a corresponding percentage of (25%). The third rank is taken by the questions corresponding to the "Understanding" level, with a frequency of (104) and a corresponding percentage of (17.7%).

From the results obtained in the above table, it is observed that the results of the question classification indicate a significant dominance of the "Applying" level questions, with nearly half of the textbook questions falling into the category of application-based questions.

This may be attributed to the developmental stage of the second-grade pupils, who are between 7-8 years of age, a developmental age corresponding to the concrete operational period, as opposed to an abstract one.

Furthermore, the curriculum focuses on equipping students with fundamental educational skills, such as arithmetic and counting. This explains the adoption of a procedural curriculum; the syllabus trains the pupil on "how to solve" mechanically rather than "thinking about the solution" or exploring diverse strategies to reach a result. Given this early developmental stage, this approach is considered an acceptable method for establishing a solid learning foundation upon which higher educational levels can be built in future stages.

- **presentation and Interpretation of the Second Research Question:**

"What is the percentage of Higher-Order Thinking Skills (HOTS) in the questions of the Mathematics and Scientific/Technological Education textbook for the second grade of primary education?"

Table (02): Classification of Questions into Higher-Order Thinking Levels

Higher-Order Thinking Levels	Frequency (f)	Percentage (%)
Analyzing	30	5.1%
Evaluating	5	0.9%
Creating	11	1.9%
Total	46	7.9%

After analyzing the textbook and classifying all the included questions, the results showed that "Analyzing" questions have the highest frequency among the "higher-order thinking" levels with (30) occurrences and a percentage of (5.1%), followed by the "Creating" level with (11) occurrences and a percentage of (1.9%), and lastly, the "Evaluating" level was found to have the lowest frequency among all the levels with only (5) occurrences and a percentage of only (0.9%), which was the lowest percentage among all the levels.

The results showed a sharp decline in the "higher-order thinking" levels and the complete absence of the "Evaluating" level. This indicates that students are never asked to express their opinion, evaluate information, and discuss the topic of interest as a learning tool to enhance critical thinking.

The marginal presence of "Analyzing" and "Creating" levels indicates only "modest attempts" within the curriculum to introduce inquiry-based activities. However, these attempts are still inadequate to encourage an investigative mindset since the main focus remains centered around simpler cognitive processes.

- **Presentation, Analysis, and Interpretation of the Third Research Question:**

"Is there a balance in the distribution of cognitive objective levels across the different units of the book?"

Table (03): Comparison between Lower-Order Thinking Skills (LOTS) and Higher-Order Thinking Skills (HOTS)

Thinking Levels	Categories	Frequency (f)	Percentage (%)	Total
Lower-Order (LOTS)	Remembering	146	25%	539 Freq. (92.1%)
	Understanding	104	17.7%	
	Applying	289	49.4%	

Higher-Order (HOTS)	Analyzing	30	5.1%	46 Freq (7.9%)
	Evaluating	5	0.9%	
	Creating	11	1.9%	

The data provided above shows, beyond any doubt, the overwhelming dominance of Lower-Order Thinking Skills (LOTS) compared to the vast majority of the textbook's questions, with a frequency count of (539) and a percentage of (92.1%). In contrast, the frequency count of Higher-Order Thinking Skills (HOTS) was found to be insignificant, with only (46) instances and a percentage of (7.9%). This number can almost be considered negligible when compared to the overwhelming majority allocated to the realm of the lower cognitive abilities.

This significant gap can be attributed to the fact that the curriculum was designed to focus on short-term behavioral objectives, whereby the student solves immediate problems or tasks through the process of rote familiarity.

From the perspective of curriculum studies, this can be defined as a significant gap between the lower and higher cognitive abilities of the students, referred to as "Cognitive Flattening." There was no "Cognitive Scaffolding" (strategic build-up) between the different cognitive abilities, and the student was confined to the cycle of memorization and application for the entire duration of the academic year.

- **Conclusion**

On the basis of the above-mentioned findings, it can be concluded that the primary curriculum for the second-grade students, "Mathematics and Scientific/Technological Education," has been designed mainly as a means of developing basic skills and a basis for future learning, but it has significantly failed to provide the development of thinking skills. Although the curriculum has been designed according to the level of the students, it has failed to provide the students with the opportunity of stimulating discovery, innovation, or creative logic.

On the basis of the above-mentioned findings, the following recommendations are proposed:

- Re-engineering Evaluative Activities: Re-design the evaluative activities to ensure that the percentage of Higher-Order Thinking Skills (HOTS) content is at least 25% to 30%, as recommended by international educational standards.
- Transitioning from Mechanical Application to Contextual Thinking: Gradually phase out the use of questions that require the application of routine solutions and introduce the concept of "Problem-Based Situations" (PBS), which require the identification of the appropriate problem-solving strategy.

- Development of Question Construction Skills: Offer teachers training on the construction of questions, changing textbook-based questions from the level of "Remembering" to that of "Analytical" thinking, using inquiry techniques such as how, why, and what if.
- Adopting Discovery Learning Strategies: Adopt the discovery learning approach, particularly for Scientific and Technological Education, to increase the scope for innovation through the development of simple models.

Bibliography List :

- Al-Ghani, A. B., & Ibn Yahya, A. (2023). *Analysis of the content of values included in the Arabic language book for the fifth year of primary school: A comparative study between the first and second generation books*. *Al-Shamel Journal of Educational and Social Sciences*, 6(2), 129–149. Algeria.
- Al-Mahmoudi, M. S. A. (2019). *Scientific research methods* (3rd ed.). Dar Al-Kutub.
- Belabbas, M., et al. (2016). *My book of mathematics, scientific and technological education – Second generation*. Ministry of National Education, Algeria.
- Obaidat, Z., & Abu Al-Sameed, S. (2007). *Teaching strategies in the twenty-first century* (1st ed.). Dar Al-Fikr.
- Obaidat, Z., & Abu Al-Sameed, S. (2007). *Teaching strategies in the twenty-first century* (1st ed.). Dar Al-Fikr.
- Tu'aimah, R. A. (2004). *Content analysis in the humanities: Concept, foundations, and applications*. Dar Al-Fikr Al-Arabi.