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Exploring Higher-Order Thinking Skills Integration in Mathematics Curriculum: A Study of Six Lebanese Schools

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Abstract

This article investigates the promotion of higher-order thinking skills in the written curriculum of six diverse schools in Lebanon, focusing on Grades 1, 2, and 3 mathematics outcomes. The educational programs encompass the International Baccalaureate's Primary Years Programme, the Lebanese National Curriculum, and the French National Curriculum. Employing Bloom's Taxonomy (1956) as the theoretical framework, the study meticulously categorizes learning objectives into six cognitive domains, shedding light on the emphasis placed on lower and higher-order thinking skills. Results reveal nuanced patterns across schools and grade levels. In Grade 1, School 4 demonstrates a notable focus on "analyze," while School 2 excels in "create." Grade 2 highlights the International Baccalaureate's Primary Years Programme, particularly School 2, for emphasizing the three higher domains of Bloom's Taxonomy (1956). The Lebanese National Curriculum exhibits variations, with School 4 emphasizing "analyze." This research holds significance amidst Lebanon's educational challenges, marked by outdated curricula, declining academic performance, and recent disruptive events. The study advocates for a paradigm shift, emphasizing the need for comprehensive educational philosophies, curriculum revisions, and student-centered teaching approaches. The findings provide valuable insights for policymakers and educators to navigate the complexities of Lebanon's educational landscape, fostering a transformative approach for resilient and innovative students amid challenging circumstances.

Keywords: higher-order thinking skills, curriculum analysis, Bloom's Taxonomy, International Baccalaureate, French National Curriculum, Lebanese National Curriculum, mathematics education, curriculum analysis

1. Introduction

John Locke, in his seminal work "Some Thoughts Concerning Education" (1738) wrote that out of all the men he met, nine parts out of ten are made "Good or evil, useful or not, by their education," and it is this education that makes "The great difference in mankind" (p.8). Regarding education in the infant years, Locke emphasized the importance of creating an atmosphere that encourages young children to love learning by providing them with age-appropriate activities that also promote creativity and play. Locke gives the example of teaching young children how to read. He argues that if you give a child who cannot read a book the book would be "unintelligible" to the child because they have yet to develop the ability to decipher the letters and create meaning from the symbols on the page. Locke writes that students should instead be exposed to the individual letters first, and then the child should try and blend these letters to form words thereby instilling in the child a "Love for Learning" (p. 6). However, the main takeaway from Locke's (1738) writings is that to educate the mind, three aspects are required: (1) a healthy body (2) a virtuous character, and (3) an appropriate academic curriculum. With the academic curriculum being one of the three main pillars proposed by Locke (1738), this study examines the academic curricula adopted in schools in Lebanon. In particular, the mathematics learning outcomes of the three main programs, the International Baccalaureate's Primary Years Programme, the Lebanese National Curriculum, and the French National Curriculum, offered in Lebanon are scrutinized to unveil the emphasis each of these programs places on higher-order thinking skills as proposed by Bloom's Taxonomy (1956).

1.1 Significance

The significance of this study lies in its unique focus on the promotion of higher-order thinking skills in mathematics for Grades 1, 2, and 3 within the Lebanese context. Compared to previous research, particularly the study conducted by Kantar (2013) on nursing programs in Lebanon, this study addresses a gap in the literature, as no prior studies have specifically explored the enhancement of higher-order thinking skills in mathematics at the elementary school level in Lebanon. Kantar's (2013) research, conducted at the university level, emphasized the challenges instructors face in dedicating time to foster higher-order thinking skills due to the pressure to cover learning outcomes in content-heavy curricula.

1.2 Research Questions

The study addresses the following research question: To what extent do the written curricula of the International Baccalaureate's Primary Years Programme, Lebanese national program, and French national program address higher-order thinking skills in the Grades 1, 2, and 3 mathematics learning outcomes?

2. Method

The institutions were purposely selected based on the programs they offer: two follow the International Baccalaureate's Primary Years Programme, two adhere to the Lebanese National Curriculum, and two implement the French National Curriculum. Purposive sampling, as defined by Etikan, Musa, and alKassim (2016), was employed to select participants, emphasizing specific qualities possessed by individuals or institutions. This nonrandom technique allows researchers to decide on participant selection based on the information needed and seeks individuals willing to contribute based on their knowledge or experience. The sampling approach did not consider other indicators such as size, geographic location, or years in operation beyond the distinction in educational programs.

Specifically, the researcher looked at the learning outcomes outlined in the respective schools' written curriculum for Grades 1, 2, and 3 in mathematics. Mathematics was chosen as a discipline as the developmental processes among students are similar. Three reasons exist for choosing mathematics as a discipline explored in this study: (1) The learning outcomes that students are expected to acquire by the end of each grade level are similar across all three programs, (2) The subject-matter knowledge of mathematics is systematically linear, with students being required to acquire certain basic mathematical concepts before moving on to more complex ones, and (3) The instructional approaches towards teaching the prescribed mathematical content can be explored with minimal differences regardless of the program being followed.

2.1 Theoretical Framework

Bloom's Taxonomy (1956) of educational objectives serves as a framework for classifying statements regarding what a student is expected to learn through instruction (Krathwohl, 2002). Designed to assist teachers and administrators facing curricular challenges, Bloom's Taxonomy (1956) encourages dialogue on specific curricular objectives, aiming to facilitate discussions with greater precision. Additionally, it aids curriculum developers in specifying objectives to plan learning experiences effectively (Bloom, 1956). The taxonomy consists of six cognitive domains: knowledge, comprehension, application, synthesis, and evaluation (Bloom, 1956). This hierarchy suggests that to attain higher-order critical thinking skills, students must first master lower levels of learning, such as recall and comprehension (Krathwohl, 2002).

Scholars have attempted to categorize learning outcomes within Bloom's Taxonomy (1956) or the Revised Bloom's Taxonomy. In 1969, a group of scholars categorized specific objectives within Bloom's hierarchy. For instance, under the knowledge category and the sub-category knowledge of specific facts, verbs such as recall, recognize, acquire, and identify are included (Metfessel, 1969).

Crowe, Dirks, and Wenderoth (2008) developed the Blooming Biology Tool (BBT), an assessment tool based on Bloom's Taxonomy (1956). The tool aims to assist the science department in aligning assessments with teaching activities and improving students' study skills and metacognition. Implementing the Blooming Biology Tool enabled the science

department to design questions targeting higher levels of cognitive skills (Crowe, Dirks, & Wenderoth, 2008). Building on this research, Thompson and O'Loughlin (2015) used Bloom's Taxonomy (1956) to categorize anatomical learning goals within the lower four levels of Bloom's. Their study found that the Blooming Anatomy Tool (BAT) contributes to "aligning observer judgment on Bloom's taxonomic levels" (p. 493).

Bloom's Taxonomy (1956) classifies statements on what a student is expected to learn as a result of instruction (Krathwohl, 2002). The taxonomy encompasses six levels of cognitive learning: Remember, Understand, Apply, Analyze, Evaluate, and Create, as defined by Anderson & Krathwohl (2001). These cognitive domains are listed in Table 1 below:

Table 1

Definition of action verbs within Bloom's Taxonomy (1956)

Action Verb according to Anderson & Krathwohl (2001) as cited in Forehand, 2005, p.6.	**Definition**
Remember	Retrieving, recognizing, and recalling relevant knowledge from long-term memory
Understand	Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining
Apply	Carrying out or using a procedure through executing, or implementing
Analyze	Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing
Evaluate	Making judgments based on criteria and standards through checking and critiquing
Create	Putting elements together to form a coherent or functional whole, reorganizing elements into a new pattern or structure through generating, planning, or producing

2.2 Definition of Terms

2.2.1 Higher-Order Thinking Skills

In the realm of education, higher-order thinking skills encompass multifaceted cognitive processes that transcend mere knowledge acquisition and algorithmic application. As defined by Zoller, Lubezky, Nakhleh, Tessier, & Dori (1995), higher-order related tasks involve tackling unfamiliar quantitative or qualitative conceptual questions. This necessitates not only a deep understanding of foundational knowledge but also the cultivation of analytical prowess, the ability to synthesize, and effective problem-solving skills (Zoller et. al., 1995). Furthermore, deCaprariis (1978) contributes to the understanding of higher-order thinking skills by emphasizing the application of known theories or knowledge to unfamiliar to unconventional situations. This process requires the deployment of reasoning, decision-making abilities, analytical thinking, synthesis, and an overarching sense of critical thinking (deCaprariis, 1978). In essence, higher-order thinking skills encapsulate a holistic cognitive approach that goes beyond the routine application of established knowledge, emphasizing the capacity for nuanced analysis, creative synthesis, and adept problem-solving in varied and unfamiliar contexts (Jansen & Möller, 2022).

2.2.2 Curriculum

According to Tawil and Harley (2004) one definition of the term curriculum is "To encompass educational philosophy, values, aims and objectives, organizational structures, teaching and learning materials and methods, student experiences, assessments, and learning outcomes…including both intended or officially prescribed, as well as implemented or the real curriculum" (p. 17). This definition of the word curriculum is applicable in the context of this study as it includes all the different components of a curriculum in an educational setting that, in turn, encompass all of the teaching and learning experiences. Glatthorn (1987) defines curriculum as "the plans made for guiding learning in schools" which are "usually represented in retrievable documents of several levels of generality, and the implementation of those plans in the classroom; those experiences take place in a learning environment that also influences what is learned" (p. 10). According to Gywnn (1952), a curriculum is a vehicle that carries the purpose of education. Similarly, based on Walker and Soltis' (2004) definition, a curriculum is the "purposes, content, activities, and organization that are inherent in the educational programs of the school" (p. 1). Walker and Soltis' (2004) definition and Gwynn's (1952) definition both mention the term, "purpose." Thus, when discussing the term curriculum, it is critical to keep in mind that the term itself should encompass all of the teaching and learning happening in an educational establishment, not only what is explicitly planned but also what is received by the student (Kelly, 2004). It encompasses the planned curriculum, or what is included and written down in the syllabus, in addition to what is received by the student that reflects and portrays their experience and interactions with the content.

2.2.3 The Written Curriculum

The planned curriculum is the written one. Anderson (1988) wrote that a current written curriculum is an "indispensable" part of having a "coordinated curriculum" as the written curriculum sheds light on the subject matter that needs to be taught and "forces" schools to take into account the progression of learning outcomes across grade levels (p.68). However, having a written curriculum that is up-to-date and well-developed is not commonplace as typically, a school's written curriculum includes outdated plans (Anderson, 1988). Anderson (1988) stated that the main purpose of the written curriculum should be reflective of reality, consistent with the school's other documents, easily understood by the teachers, and perhaps most important of all, useful to teachers in real classroom situations.

According to Glatthorn (1999), the written curriculum is composed of the documents that are provided by the school to the classroom teacher to specify what is to be taught. The written curriculum is what teachers rely on to deliver specific learning outcomes for a particular subject or grade level. Echoing this definition, Kubitskey and Fisherman (2006) wrote that the written curriculum represents an "instructional philosophy" that is designed to "teach specific subject matter" that is stipulated by various authorities (p. 364). The written curriculum is, ultimately, what guides what is happening inside the classroom (Montgomery, 2010).

2.3 Overview of Academic Curricula Adopted in Lebanon

2.3.1 The International Baccalaureate's Primary Years Programme

The International Baccalaureate's Primary Years Programme is designed for learners aged between 3 and 12 and is a transdisciplinary approach to learning with a strong focus on inquiry-based teaching and learning (IBO, 2021a). The Primary Years Programme aims to create a student-centered learning environment and encourages students to become lifelong learners (IBO, 2021a). The Primary Years Programme places a large emphasis on the holistic development of the child by aiding them to be inquirers, both inside and outside of the school community (IBO, 2021a). Jagersma and Parsons (2011) argue that the Primary Years Programme presents a perspective beyond the notion of the curriculum as a plan rather the curriculum should be thought of as "lived in classrooms" (p. 716).

The Primary Years Programme curriculum framework has three main pillars - the learner, learning and teaching, and the community (IBO, 2021a). At the heart of the Primary Years Programme is the learner and the programme's curriculum framework centers around the notion that students are "agents of their own learning" and "partners in the learning process" (IBO, 2021b). The learner in the Primary Years Programme is responsible for their own learning and has the "innate potential" to question themselves, theorize observations, and wonder about the world around them (IBO, 2021b). The International Baccalaureate Organization also aims to hone a list of attributes that they want their students to embody. These skills are brought together under the International Baccalaureate's Learner Profile. The organization's goal is to develop learner attributes that are required for success beyond academics such as inquirers, thinkers, and communicators (IBO, 2021d).

The Primary Years Programme ensures that learning is "engaging, relevant, challenging and significant" (IBO, 2021c). They achieve this by joining these aspects of learning together under a transdisciplinary and conceptual approach to inquiry. Lüddecke (2016) writes that the six transdisciplinary themes that are part of the curriculum framework address civic and global issues in order to expand the context of the learning and make it relevant to the needs of the global society. This inquiry approach to education also encourages students to engage with knowledge on a deeper level and to engage "critically and creatively" with their ideas (IBO, 2021c). This pedagogical approach requires molding a certain set of skills in the learner, and the Primary Years Programme encapsulates these under the "Approaches to Learning Skills" (IBO, 2021c). The International Baccalaureate Organization and its programmes broadly support their learners in developing the following skills: thinking, communication, research, self-management, and social (IBO, 2021c). It is the learning community's responsibility to support students in their acquisition of the aforementioned skills.

2.3.2 The Lebanese National Curriculum

Lebanon's history is characterized by foreign occupations, notably under the Ottoman Empire, the French Mandate after World War 1, and the devastating Civil War. The nation's unique confessional democracy, shaped by its diverse religious communities, has impeded political progress, infrastructure development, and education reform.

Under Ottoman rule, education was primarily overseen by religious clergy, but the arrival of missionaries from France, Britain, and the USA introduced new schools, intensifying the sectarian divide as different religious groups established their own educational institutions (Frayha, 2003). The French Mandate aimed to develop public education but perpetuated divisions, allowing private and religious schools autonomy (Sbaiti, 2008).

The Lebanese constitution in 1926 outlined a parliamentary system, emphasizing Arabic literacy. Post-independence in 1943, education became a tool for national unity, emphasizing Arabic, history, and geography. However, the Arab-Israeli conflict in 1948 and the arrival of Palestinian refugees strained Lebanon's delicate communal balance (Ellis, 1999). The Civil War (1975-1990) further disrupted education, making schools inaccessible. The Ta'ef Agreement in 1989 aimed to restore stability and outlined reforms, but subsequent attempts in 1994 and 2010 failed to bring significant change. The lack of a clear educational policy and systematic implementation has led to sporadic curriculum modifications every few decades (Frayha, 2012).

Presently, Lebanon's education system is highly centralized, with the Ministry of Education controlling key aspects. Public schools lag behind private ones in quality (Gonzalez, Karloy, Constant, Salem & Goldman, 2008. The Lebanese curriculum includes a common standard up to Grade 9, national exams (Brevet), and tracks in Grades 10 - 12 leading to the Lebanese Baccalaureate. Despite these structures, the education system faces challenges such as malpractice, a lack of comprehensive reform, and a continued struggle for national unity through education (Vlaardingerboek, Al-Hroub, & Saab, 2017). These challenges underscore the pressing need for a holistic and sustainable approach to education in Lebanon, addressing

historical legacies and positioning the nation's youth for a more cohesive and prosperous future.

2.3.3 The French National Curriculum

The idea of a national education system in 18th century France originated with the phillosophes during the Enlightenment but was established by Napoleon Bonaparte later (Green, 1990). Before this, elementary and secondary schools were under church control (Green, 1990). Rousseau's "Emile" and La Chalotais's essay on national education influenced Napoleon's principles (Green, 1990). Public education, according to Napoleon, aimed to unify and strengthen the state (Grab, 2015).

The Revolutionary War drove the reinvention of education in France, marking a new era of state formation across Europe (Green, 1990). The Napoleonic Universitė, designed to control all schools, standardized national exams, and the curriculum (Green, 1990; Grab, 2015). While not achieving all goals, the Revolution emphasized mass education and played a crucial role in national unity (Green, 1990). Post-Napoleon, France established a basic framework for education with centralized administration, setting the stage for later developments (Green, 1990). Education reforms remain a significant legacy of the Napoleonic era (Grab, 2015).

Despite the Napoleonic reforms, challenges persisted and education in France faced further evolution in the 1800s (Green, 1990). Modern France maintains compulsory schooling from age 6 - 16, with the curriculum last updated for primary schools in 2015-2016 (Guedet, 2017). The coexistence of state and private schools, with eighty-three percent of students in the former and seventeen percent in the latter, reflects the diversity of the education system (Eduscol, 2017). Ongoing assessments of the common core at key educational phases ensure the maintenance of rigorous standards throughout compulsory schooling (Eduscol, 2012). The common core sets minimum standards acquired progressively from kindergarten to upper secondary with assessments at key stages (Eduscol, 2012).

2.4 Tools, Analysis, and Procedures

The data collection for this study took place throughout the 2021-2022 academic year, spanning from September to June, covering a period of nine months. The researcher conducted visits to each of the six schools situated in various districts across Lebanon, obtaining copies of the mathematics discipline-specific scope and sequence.

For the document analysis of the written curriculum, electronic versions of the mathematics scope and sequence were obtained from the respective school administrators. The primary goal of document analysis was to scrutinize the written curriculum. The researcher systematically listed the learning outcomes outlined in each grade level's discipline-specific scope and sequence for mathematics in an Excel document. Using the six action verbs of Bloom's Taxonomy (1956) - Remember, Understand, Analyze, Evaluate, and Create - as column titles, the researcher cross-referenced the action verb used in the mathematics learning outcome, following the definitions provided by Anderson & Krathwohl (2001). The three action verbs on the left (Remember, Understand, and Apply) correspond to lower-order thinking skills, while the last three (Analyze, Evaluate, and Create) pertain to higher-order

thinking skills. The process of sorting the learning outcomes in the mathematics scope and sequence is illustrated in Table 2, providing a visual representation of the analysis undertaken.

Table 2

Sample learning outcome as part of the school's written curriculum and corresponding categories in Bloom's Taxonomy.

Learning Outcome	Action Verb	Remember	Understand	Apply	Analyze	Evaluate	Create
Read numbers up to 20	Read			X			
Extend and create patterns in numbers, for ex. odd and even numbers and skip counting.	Create						X
Understand that sets can be organized by one or more attributes including Venn and Carroll diagrams.	Understand		x				

3. Results

The analysis of the written curriculum encompassed a quantitative approach. To initiate the document analysis phase, the researcher acquired the learning objectives from the mathematics scope and sequence of the two schools offering the International Baccalaureate's Primary Years Programme. The aim was to scrutinize mathematics learning objectives for Grades 1, 2, and 3, categorizing them under the six domains of Bloom's Taxonomy (1956) - Remember, Understand, Apply, Analyze, Evaluate, and Create. Guided by Anderson and Krathwohl's (2001) definitions, the researcher systematically organized the learning objectives in an Excel document. The total count of action verbs per domain was considered, allowing the calculation of the percentage of each action verb within the learning objectives. Subsequently, the total percentage of learning objectives was classified as either belonging to the lower-order or higher-order domains of Bloom's Taxonomy (1956).

Categorizing the learning objectives into the six domains required a meticulous process. Each grade level's math learning objectives were read, and the action verb was cross-referenced with its respective domain in Bloom's Taxonomy (1956), utilizing Anderson & Krathwohl's (2001) definitions. For example, a Grade 1 objective in School 1, involving the understanding of two-dimensional shapes in the immediate environment, was classified under the Understand category. Another objective in School 2, requiring the creation of tally marks and interpretation of data, fell under the Create dimension. However, some objectives, like estimating sums and differences, posed a challenge as the action verb "estimate" did not explicitly align with Bloom's Taxonomy (1956). These objectives were categorized under the Apple dimension, considering the broader perspective of applying prior knowledge to make estimates.

This meticulous approach was applied to all learning objectives across all grade levels in the six schools under study. The analysis aimed to shed light on the inclusion of higher-order objectives in the mathematics scope and sequence. Table 3 provides a tabularized overview of this data.

Table 3

Number and Percentages of Learning Objectives in Schools 1 to 6 in Grade 1 According to Bloom's Taxonomy

Remember

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	5	15	2	2	17	4
Percentage of Learning Objectives	14.7%	32.60%	5.12%	5.55%	35.31%	9.75%

Understand

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	19	12	5	3	4	26
Percentage of Learning Objectives	55.8%	26.08%	12.80%	8.33%	8.33%	63.41%

Apply

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	7	7	31	26	25	5
Percentage of Learning Objectives	20.5%	15.21%	79.48%	72.22%	52.08%	12.19%

Analyze

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	1	0	1	5	0	0
Percentage of Learning Objectives	2.94%	0	2.56%	13.88%	0	0

Evaluate

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	0	1	0	0	0	1
Percentage of Learning Objectives	0	2.17%	0	0	0	2.40%

Create

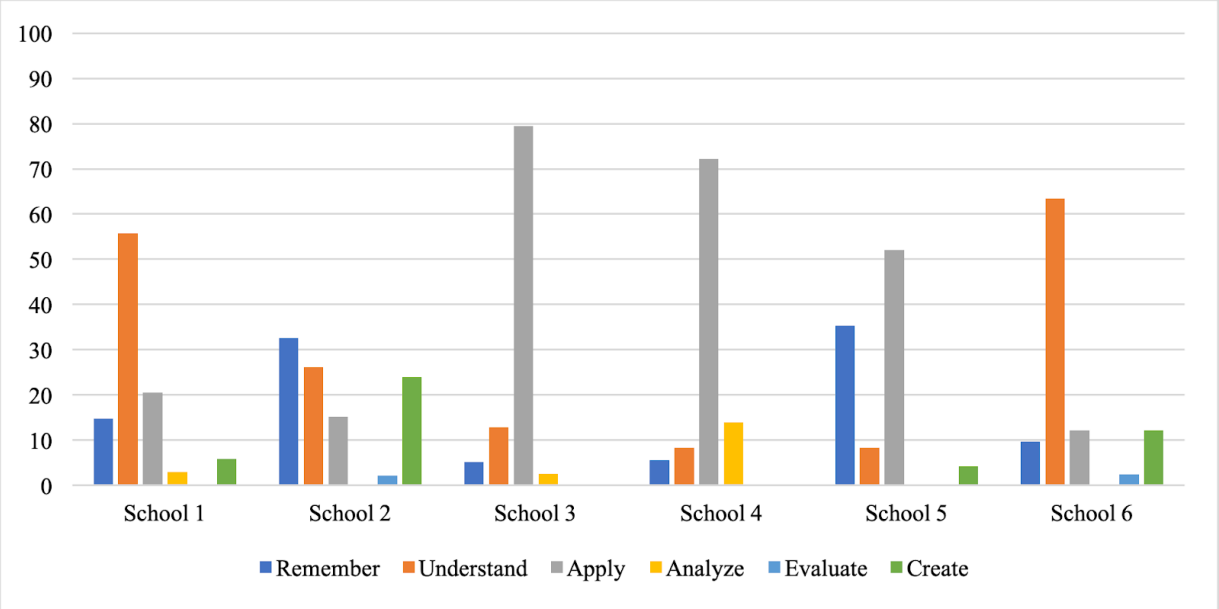
	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	2	11	0	0	2	5
Percentage of Learning Objectives	5.88%	23.91%	0	0	4.16%	12.19%

Table 2 demonstrates the breakdown of how the total number of learning objectives are divided among the six dimensions of Bloom's Taxonomy (1956) in Grade 1 for all six schools. The researcher repeated the aforementioned categorization process for the learning objectives listed in the written curriculum for Grades 2 and 3 in Schools 1 to 6.

Figures 1, 2, and 3 outline the number of learning objectives that fall in each of the six domains of Bloom's Taxonomy (1956) for Grade 1. Table 13 and Figure 10 reference the Grade 1 learning outcomes in Schools 1 and 2 that offer the International Baccalaureate's Primary Years Programme. Table 14 and Figure 11 reference those in Schools 2 and 3 that offer the Lebanese National Curriculum, and Table 15 and Figure 12 reference the Grade 1 learning outcomes in the schools that offer the French National Curriculum, Schools 5 and 6.

Figure 1

Distribution of Percentage of Learning Outcomes Per Domain in Bloom's Taxonomy for Grade 1 in Schools 1 - 6



The data from the written curriculum for Grade 2 are outlined in Table 4 below:

Table 4

Number and Percentages of Learning Objectives in Grade 2 According to Bloom's Taxonomy for Schools 1 - 6

Remember

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	11	19	0	2	11	2
Percentage of Learning Objectives	20%	45.23%	0	5.55%	19.64%	3.50%

Understand

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	21	8	6	3	9	19
Percentage of Learning Objectives	38%	19.04%	20%	8.33%	16.07%	33.33%

Apply

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	20	4	24	26	36	17
Percentage of Learning Objectives	36%	9.5%	80%	72.22%	64.28%	29.82%

Analyze

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	1	0	0	5	0	2
Percentage of Learning Objectives	1.81%	0	0	13.88%	0	3.50%

Evaluate

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	0	3	0	0	0	0
Percentage of Learning Objectives	0	7.14%	0	0	0	0

Create

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	2	8	0	0	0	9
Percentage of Learning Objectives	3.63%	19.04%	0	0	0	15.78%

Figure 2
Distribution of Percentage of Learning Outcomes Per Domain in Bloom's Taxonomy for Grade 2 in Schools 1 – 6

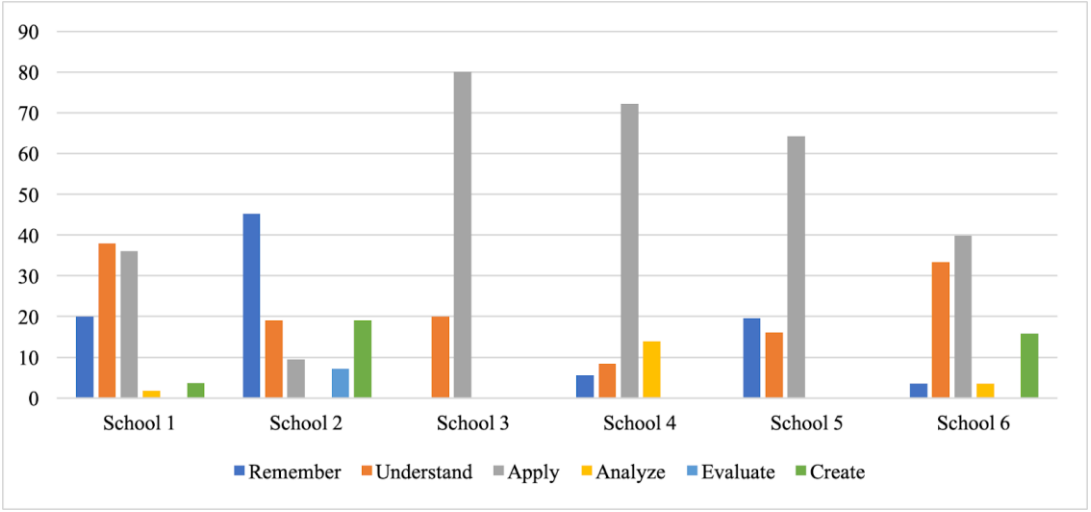


Table 5 below demonstrates the breakdown of how the total number of learning objectives are divided between the six dimensions of Bloom's Taxonomy (1956) in Grade 3 for all six schools.

Table 5

Number and percentages of learning objectives in Grade 3 according to Bloom's Taxonomy for Schools 1 - 6

Remember

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	16	13	0	1	14	10
Percentage of Learning Objectives	25.39%	30.23%	0	2.94%	31.81%	15.38%

Understand

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	13	9	3	8	4	12
Percentage of Learning Objectives	20.63%	20.93%	13.63%	23.52%	9.09%	18.46%

Apply

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	24	8	19	22	26	29
Percentage of Learning Objectives	38.09%	18.60%	86.36%	64.70%	59.09%	44.61%

Analyze

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	3	1	0	3	0	3

Percentage of Learning Objectives	4.76%	2.32%	0	8.82%	0	4.61%

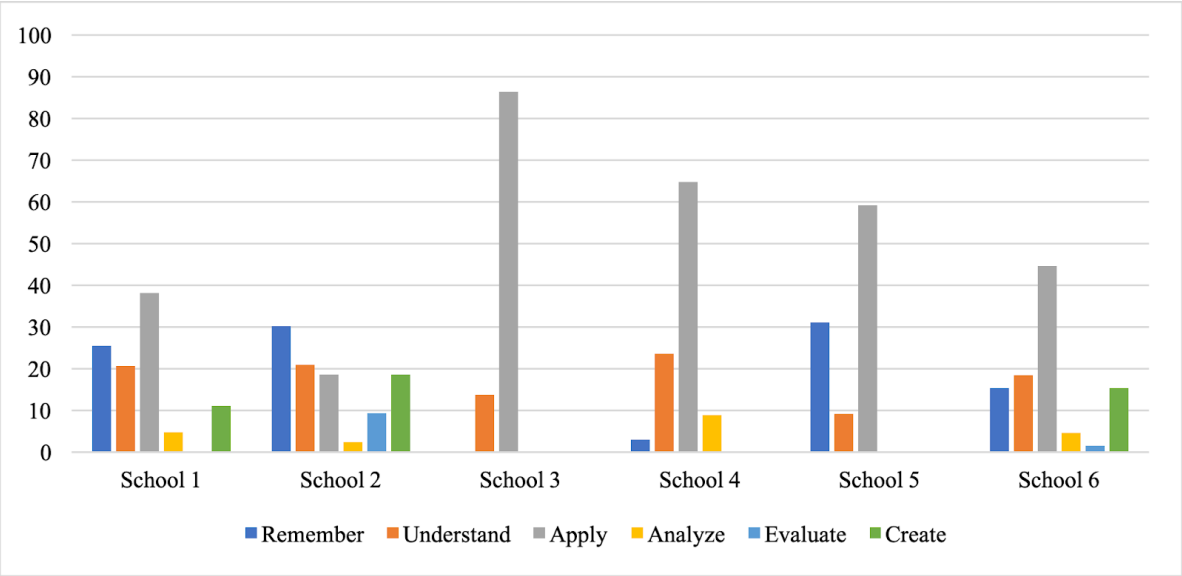
Evaluate

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	0	4	0	0	0	1
Percentage of Learning Objectives	0	9.3%	0	0	0	1.50%

Create

	School 1	School 2	School 3	School 4	School 5	School 6
Number of Learning Objectives	7	8	0	0	0	10
Percentage of Learning Objectives	11.11%	18.60%	0	0	0	15.38%

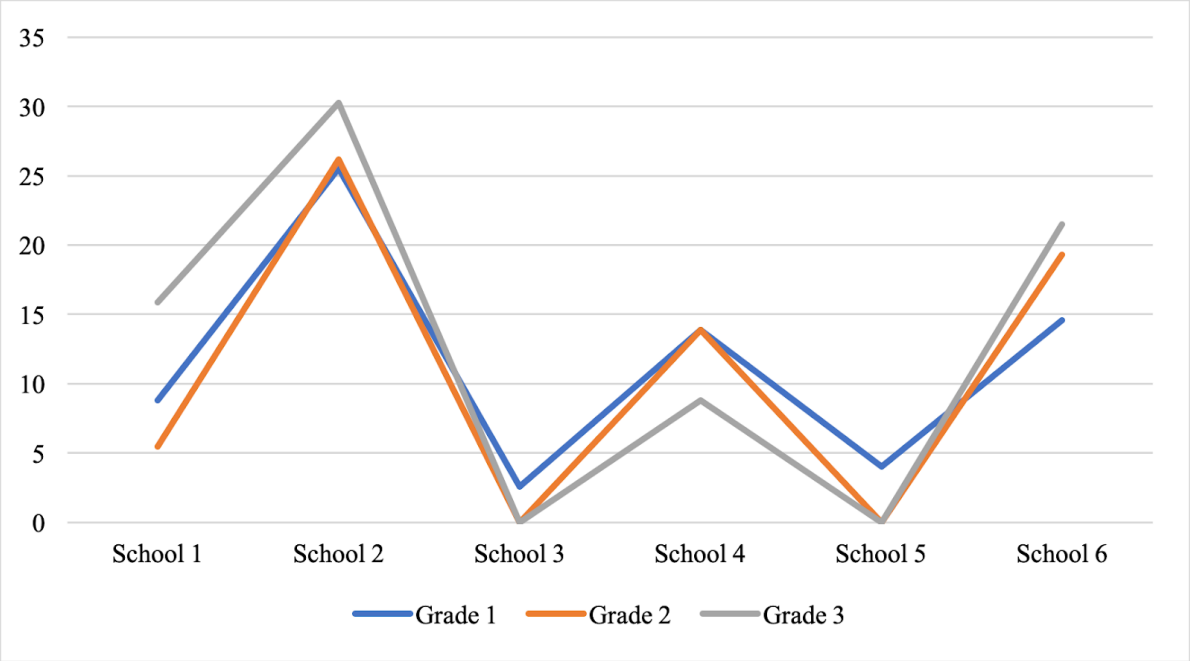
Figure 3
Distribution of percentage of learning outcomes per domain in Bloom's Taxonomy for Grade 3 in Schools 1 – 6



The total percentage of higher-order thinking skills in the written curriculum in Grades 1, 2, and 3 are outlined in Figure 4 below. In terms of the overall promotion of higher-order thinking skills and across grade level programs, School 2 had the largest percentage of learning outcomes that fell within the three higher domains of Bloom's Taxonomy (1956) as listed in the mathematics scope and sequence for Grades 1, 2, and 3.

Figure 4

Percentage of Higher-Order Thinking Skills in the Written Curriculum according to Bloom's Taxonomy for Grades 1, 2, and 3 in Schools 1 - 6



4. Discussion

The examination of higher-order thinking skills in the written curriculum for Grades 1, 2, and 3 across Schools 1 - 6 was conducted using Bloom's Taxonomy (1956). Analyzing the mathematics learning outcomes in Grade 1, School 4 demonstrated the highest percentage of outcomes categorized under "analyze" at approximately fourteen percent. School 6 had around two and a half percent under "evaluate," while School 2 led with approximately twenty-four percent categorized under "create." Despite these findings, there is no discernible pattern in the distribution of higher-order action verbs for Grade 1.

In Grade 2, School 4 had about fourteen percent of outcomes categorized under "analyze," while School 2 was the only one with outcomes in the "evaluate" domain. For "create," School 2 again led with around nineteen percent. Consequently, in Grade 2, School 2, offering the International Baccalaureate's Primary Years Programme, stood out for having the highest number of outcomes corresponding to the three higher domains of Bloom's Taxonomy (1956) - analyze, evaluate, and create.

Moving to Grade 2, School 4, following the Lebanese National Curriculum, had about nine percent of outcomes categorized under "analyze." For "evaluate," School 2 had approximately ten percent, and for "create," School 2 led again with close to nineteen percent. Overall, School 2 demonstrated the highest number of mathematics learning outcomes categorized under the three higher levels of Bloom's Taxonomy (1956) - analyze, evaluate, and create.

5. Conclusion

The current educational climate in Lebanon is suffering on multiple fronts. The Lebanese National Curriculum was last updated in 1997 despite multiple attempts to revise it (Ghosn-Chelala, 2020). In the context of mathematics, Lebanon initially aligned with international standards for Grade 8, as indicated by its performance meeting the global average in the Trends in International Mathematics and Science Study in 2007 (Abdul-Hamid & Yassine, 2020). However, it is noteworthy that by 2015, Lebanon's performance has declined, falling below the international average (Abdul-Hamid & Yassine, 2020). Lebanon's subpar performance in relation to the international average was further evident in the Program for International Student Assessment (PISA) 2015 outcomes (World Bank, 2016). PISA assessed the learning achievements of 15-year-olds in math, science, and reading, and the results indicated that Lebanese students were, on average, roughly four years of schooling behind their peers in the Organization for Economic Co-operation and Development (World Bank, 2016). Adding on to this, the dire economic situation spurred by political uprisings in October 2019, the COVID-19 pandemic, and the explosion of the Beirut port in August 2020 further exacerbated the country's situation (Bizri, Khachfe, Fares, & Musharrafieh, 2021; Kharroubi, Naja, Diab-El-Harake, & Jomaa, 2021). The multiple crises facing Lebanon has resulted in almost one hundred thousand skilled professionals - such as doctors, nurses, and teachers - to flee the country in search of better opportunities abroad, thus contributing to further brain drain in the country (Ramadan, 2022). Therefore, in light of the tumultuous history and recent disruptive events in Lebanon and their profound impact on education, conducting research that contributes to the promotion of higher-order thinking skills in a Lebanese setting is crucial. This research provides policymakers and educators with valuable data that, if utilized effectively, has the potential to positively influence the academic achievement of Lebanese students amidst these challenging circumstances.

Amidst economic and political crises, Lebanon's educational sector faces unprecedented challenges, marked by a significant shift of students from private to public schools due to financial constraints. The Ministry of Education and Higher Education grapples with limited budget allocations, hindering the sector's resilience amid regional, political, economic, and social turbulence. To tackle these issues, a proactive stance is essential. The Ministry must implement a comprehensive educational philosophy, focusing on regular curriculum revisions and incorporating educational philosophy, focusing on regular curriculum revisions. Mathematics and program coordinators play a pivotal role in driving change and promoting higher-order thinking skills. The results of this study identify a focus on lower-order thinking

skills in Lebanese mathematics education, emphasizing the need for a paradigm shift. This shift necessitates collaboration with stakeholders, governmental intervention, and a commitment to student-centered teaching, aiming to transform Lebanon's mathematics education. Successfully addressing these challenges not only enhances the educational landscape but also prepares students as innovative problem solvers for the evolving global landscape.

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