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Analysis of Mathematics Curriculum for Upper Primary Level in Somalia

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Abstract

This study investigates the perceptions of mathematics teachers regarding the newly implemented mathematics curriculum in upper primary grades. The findings indicate that while the goals of the curriculum are in compliance with the activities, the number of activities and examples provided are not sufficient. The teachers suggest that the examples should be designed to improve students' imagination, and the activities should be related to daily life experiences. The study emphasizes the curriculum's goal to develop mathematical literacy, including basic math concepts, mathematical language, problem-solving, and other skills. The teachers recommend that the evaluation process

should focus on implementation rather than memorization and assess applicable information. The study highlights the importance of integrating different methods of evaluation to prevent malfunctions in the implementation of the curriculum. The teachers emphasize that the updated curriculum should support students' multidimensional development and promote the transition from passive to active learners in society. Overall, the study suggests that the curriculum should be designed to facilitate the solving of real-life problems, using visual and concrete means to deepen learning and ensure successful implementation.

Keywords: Analysis, upper primary, Mathematics, curriculum, Mathematics teacher,

1. Introduction

A curriculum is made up of the contents that education authorities, such as the Ministry of Education in charge of educating future generations want to focus. Depending on societal developments, these contents might alter. Each nation must therefore constantly assess its position from many angles and change its curriculum to include contents that are pertinent to contemporary society. However, a number of variables make it challenging to modify the curriculum to fit their society.

Education is a powerful tool for social development, especially in post-conflict states where education has the potential to promote social change and reconciliation (Barakat, 2008; Burde et al., 2017; Ellison, 2014; Hilker, 2011; Naylor, 2015; Paulson, 2007; Smith, 2011; Tawil & Harley, 2004).

"The Somalia previous curriculum was developed in 1996 and was developed at a time when the country was in a very different situation and the needs of the society were also different. Changing technology, and changing ideas on how and what children should learn have also impacted this process. The new curriculum is intended to help reform the education system, modernize it and ensure that its graduates fit for this 21st century" NCFWSFG (Updated, 2020)

"Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology, and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education, therefore, provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject"[(1)].Mathematics, which is used in many fields, including the study of nature, various forms of technology, architecture, the construction industry, banking, scientific research, cartography, etc., plays an important role in human life (Hodanova & Nocar, 2016). Mathematics can generally be defined as a scientific field of study in which quantitative relations, measurements, and

(1)https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf

operations are investigated and conducted using numbers and symbols (Yadav, 2017). The specific abstract aspect of mathematics leads to complexities in understanding it (Karagöz, 2010). Learning without understanding is one of the most important problems encountered in mathematics education (Fuson, Clements & Sarama, 2015). This is because mathematics is an important factor in everyone's life. According to Gravemeijer, Stephan, Julie, Lin, and Ohtani (2017), the main aim of mathematics education should be to educate individuals who can use mathematics in their daily lives. An individual's use of mathematics in their daily life will make mathematics an understandable, concrete skill for them. Arthur, Owusu, Asiedu-Addo and Arhin (2018) suggest that students' interest in mathematics depends on the ability of teachers to associate mathematics with daily life.

Three major concepts are patent in this study: curriculum orientations, teaching concepts, and pedagogical awareness. Cheugn and Ng (2000) define curriculum orientation as teachers' beliefs about the education goals and the curriculum components such as objectives, content, teaching, learning, activities, and assessment methods. The teaching concept is argued by Ball et al. (2008) as being related to everything that enables the learning process, such as pedagogical approaches and interactions. Björklund and Barendregt (2016) state that pedagogical awareness is understood as a direct relation between preschool

teachers content and curriculum knowledge, that shapes the teaching and learning environment

The mathematics curriculum has an important impact on the way teachers teach in the classroom. And the teacher applies an approach or methodology, allocates a set of problems for students to solve on their own, and evaluates a student in a traditional curriculum using a traditional teaching method.

In contrast to the curriculum now in use in schools, Interactive Mathematics Curriculum (IMC) is focused on the process part of mathematics. According to Cuoco, A.A. et al. (1996:377), the organizing concept of IMC is the "Habit of Mind" the students are expected to develop whereas in the traditional curriculum, the organizing principle is the "content." A curriculum designed around habits of mind comprises both the content and the process.

Mathematics curricula in developing countries are often founded on values and ideals that were imported from former colonial powers (Atweh & Clarkson 2001; (Nebres,1988). For example, the mathematics curriculum in Somalia during the colonial period was the one used by the British and Italian in Somalia.

The problem of an unsuitable curriculum for children occurred not only in African countries but also in various other countries (Goldman, 1970).

However, African countries including Somalia are unique in that those curricula were transplanted directly from former

colonial powers. Besides, many of them still use the language of the colonial country.

The process of transplanting curricula from developed to developing countries has been criticized for causing unsuitability in mathematics education in developing countries (Gerdes,1986).

Curricula from other countries are applied without any adjustment. This is due to the internal issues in developing countries as well as the lack of human resources in curriculum development. For example, most African countries have shifted towards competency-based curricula within recent curriculum revisions (Abdelalil et al., 2012; Kusaka, 2020), and such a shift has an exogenous character since there was pressure from political negotiation with aid donors. Consequently, the UNESCO report 'Education for All' (2000–2015) (UNESCO, 2015a) mentioned that the failure of curriculum reforms was one of the reasons behind the poor quality of education in some developing countries.

There is no doubt that the appropriate revision of the national curricula can lead to true improvements in the quality of education. However, curriculum revision in developing countries has been observed from the tension between this global trend and social necessities. It seems obvious that the process of developing 'curricula with relevance to the context' constitutes a major task for every country.

1.1 Problem Statement

The Mathematics Curriculum for the Upper Primary level in Somalia has not been thoroughly analyzed, leading to gaps in understanding its effectiveness in enhancing students' mathematical skills. This lack of analysis may result in a substandard education system that fails to equip students with the necessary mathematical skills for future success.

Indeed, there is a gap between the skills students acquire and the necessities of life and work in our present time. It can be strongly claimed that the curriculum has inadequately prepared students for these two areas. The learning outcomes of the present Math curriculum are insufficient for preparing students for life and work. Therefore, the present study aims to investigate the provision reality of the Math curriculum requirements for the upper primary level in light of Somali Curriculum Framework Outcomes. In addition, it seeks to build a proposed perspective for the Math curriculum to meet this Curriculum framework.

1.2 Importance of the Study

Math education receives international and local attention in terms of developing its curriculum continuously in a way that fits knowledge high acceleration and tremendous development in all fields of Math. Mathematics makes our life orderly and prevents chaos. Certain qualities that are nurtured by mathematics are the power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem-solving ability, and even effective

communication skills. Mathematics is also linked to and supports technological progress. Therefore, the development of the math curriculum is very important. Moreover, Somalia's curriculum framework addresses curriculum development and improvement to make education more appropriate for all. It raises the quality of its outcomes and enhances the skills and abilities of its people. The findings of this study may help education policymakers to identify areas for improvement and make informed decisions regarding the development of the Mathematics Curriculum.

1.3 Questions of the Study

The present study aims to provide answers to these two main questions: How do educational experts perceive the current provision of requirements in the Somali Curriculum framework for the development of math curriculum at the upper primary level? What are the perspectives of educational experts on how to develop the math curriculum for the upper primary grades that align with the requirements of the Somali Curriculum framework for the future?

1.4 Research Objectives

The objective of this study is to examine the perspectives of mathematics teachers regarding the newly implemented mathematics curriculum at the upper primary level, starting from the 2020/2021 academic year. The study aims to evaluate the effectiveness of the curriculum in achieving its goals, the suitability of the activities designed to reach the predetermined

objectives, and the adequacy of the assessment and evaluation methods employed. Based on the findings, the study also proposes recommendations for the improvement of the curriculum.

2. Somali Curriculum Framework

2.1 Somalia Curriculum values

Somalia Curriculum Framework seeks to ensure that all children irrespective have access to quality education that will prepare them for a fulfilling and productive role at community, country, region, and global level. This Curriculum Framework is based on and reflects the values held by Somali society. The Ministry of Education intends that all students learn to acquire the following values:

1. Appreciate and apply Islamic values
2. Develop a strong sense of patriotism and love of their country and community
3. Develop an appreciation of their own cultural inheritance
4. Develop ascetic values which appreciate the beauty and its expressions in nature and the arts
5. Value integrity in themselves and others including respect for property and life
6. Develop self-discipline including appropriate behavior and timekeeping

7. Respect and value the rights of all people irrespective of gender, ability, social standing, or geography

8. Respect and value the environment

9. Develop and value a healthy mind, body, and spirit

10. Develop creative and problem-solving skills

11. Become confident individuals with skills and knowledge that will enable them

to adapt and contribute to a changing society, economically and socially

2.2 Education structure

According to the National Policy education structure of the school system has four distinct sectors as outlined below:

1. Preschool – 2 years

2. Primary School - 8 years (lower 4 years and 4 years upper Primary)

3. Secondary Education – 4 Years.

4. Post-Secondary Education

2.3 Outcomes of Primary Education

Primary Education is the basis of education achievements for Somali children. By the end of the Primary cycle, it is intended that the learners will have:

1. Be equipped with Islamic knowledge, moral values, and nationalism.
2. Improved their physical, effective, and cognitive skills and provided them with knowledge and practical skills.
3. Acquired appropriate knowledge, insights, skills, and values, which will empower them to realize their potential and make worthwhile contributions to society.
4. Developed listening, speaking, reading, and writing skills in Somali, Arabic, and English.
5. Have a sound foundation of numeracy and the application of mathematics to practical problems.
6. Appreciation for the contribution of the family, community, and national development and for the interdependence of the various communities in Somalia.

2.4 Upper Primary Mathematics Outcome

By the end of this level, the following broad outcomes will be accomplished Learners will develop computational skills in whole numbers up to millions, place value, squares and square roots, and cube roots of up to 3-digit numbers. Carry out calculations involving indices and logarithms, Sets; union, intersection, and subsets; demonstrate recognition of number patterns, work out areas of plane shapes; circles, quadrilaterals, and combined shapes, problem-solving in perimeter, circumference, and area and their units, apply formulae of area, volume and capacity of

solids, solve everyday life problems involving money and rates, bills, commissions, discount and percentage discount, speed, distance and time, and average speed. Learners should demonstrate computational skills in everyday life problems involving fractions, decimals, percentages, and order of operations, and carry out problem-solving in geometry in triangles, similarity, and congruency, construction of triangles, carry out constructions of inscribed and circumscribed triangles, demonstrate the use of Pythagoras theorem in Quadrilaterals, analyze tables and graphs and carry out conversions of graphs, work out Mean, mode, median of a set of data, draw bar graphs, Pie charts. The learners should be able to solve basic probability questions, algebra, linear equations with two variables, linear simultaneous equations, and quadratic equations involving word problems.

3. METHODOLOGY

3.1. Research Model

The study was structured in the survey model based on a mixed method, and the study population consisted of Upper primary schools associated with the Ministry of Education Culture and Higher Education of Somalia.

3.2. Study Group

The easily accessible sampling method from purposive sampling methods was adopted in forming the study group of this

research. The sample consisted of 20 math teachers from 10 upper primary schools in Mogadishu City Somalia.

- Five of the teachers have expressed their views related to the curriculum of 5th grade,
- Five of the teachers have expressed their views related to the 6th grade,
- Five of the teachers have expressed their views related to the 7th grade,
- Five of the teachers have expressed their views related to the 8th grade.

Demographic information of math teachers for the study.

Table 1. Demographic features of math teachers participating in the study.

Independent Variables	Groups	f (frequency)	% (percentage)
Gender	Female	3	15
	Male	17	85
Years of teaching	1-5	5	25
	6-10	7	35
	11-15	4	20
	15-20	3	15
	21 and over	1	5
Classes	5^{th} Grade	6	30
	6^{th} Grade	6	30

Independent Variables	Groups	f (frequency)	% (percentage)
	7th Grade	4	20
	8th Grade	4	20
Receiving In-Service Training	Yes	16	80
	No	4	20
Graduated Faculty	Education	17	80
	Other	3	20
Total		20	100

It is seen in Table 1 that 3(15%) participants are female and 17(85%) participants are male. When participants' teaching experience was examined, it is observed that participants fall intensely in the range of 6-10 years (35%). While 6 (30%) participants teach in 5th grade, 6 (30%) participants teach in 6th grade, 4 of them (20%) teach in 7th grade and 6 (40%) participants teach in 8th grade. While 16 (80%) participants received in-service training,4 (20%) participants did not.17(85%) participants graduated from the Faculty of Education, and 3 (15%) participants graduated from other Faculties.

3.3 Data Collection and Analysis

As the data have been collected through the method of interview, a «semi-structured interview form» has been used. Expert opinion has been made used for the validity and reliability of this form. The data have been analyzed quantitatively in

frequency and percentages and the findings have been described in detail.

4. Results

Opinions of Teachers who participated in the Study for the New Math Curriculum

Table2. Items that Have the Highest Percentage (%) the Goal Dimension of the Math Curriculum

Items for goals	Agree		Not Sure		Disagree	
	(f)	(%)	(f)	(%)	(f)	(%)
1.Targeted goals are clear and understandable.	15	75	2	10	3	15
2. Goals are consistent	14	70	2	10	4	20
3.Goals are in accordance with student levels	8	40	1	5	11	55
4.Goals were formed in accordance with the general objectives of the curriculum	13	65	3	15	4	20

As seen in Table 2, 15 (75%) of 64 math teachers indicated that goals are clear and understandable, 14 (70%) math teachers indicated that goals are consistent,11(55%) math teachers indicated that goals are not in accordance with student levels and 13 (65%) teachers indicated that goals are relevant for the general objectives of the program for goals.

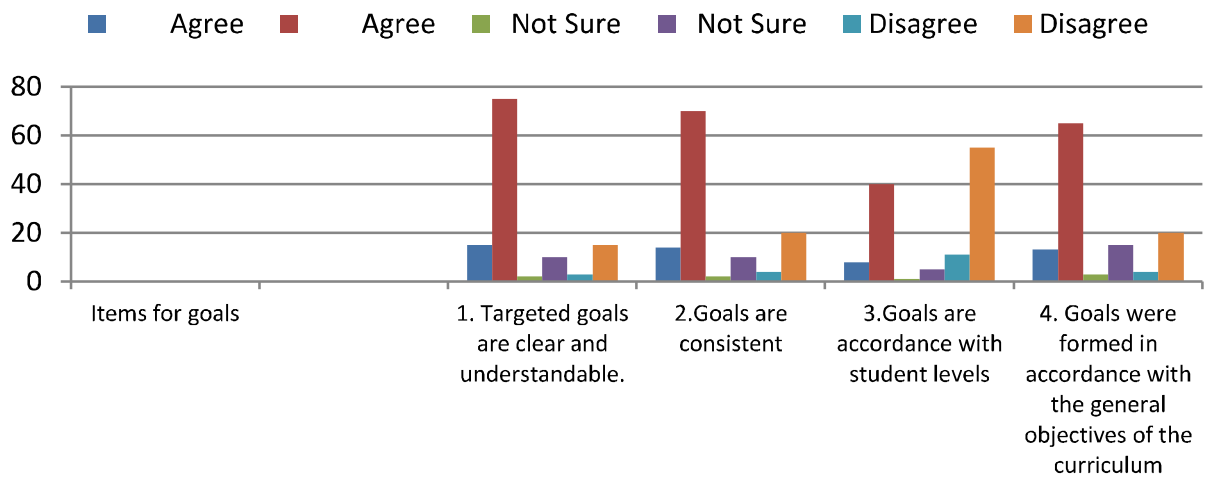


Figure1. Items that Have the Highest Percentage (%) of the Goal Dimension of the Math Curriculum

Table 3. Items that Have Highest Percentage in the Content of the Math Curriculum

Items for the Content	Agree		Not Sure		Disagree	
	(f)	(%)	(f)	(%)	(f)	(%)
1. Concrete examples are given in the content.	8	40	3	15	9	45
2. Goals in the curriculum are consistent with the contents	14	70	2	10	2	10
3. The program content is understandable by teachers and students.	10	50	3	15	7	35
4. The content enables students to develop alternative methods for the solution	11	55	3	15	6	30

As seen in Table 3, 9(45%) teachers of the 20 math teachers who participated in the study indicated that concrete examples were not given in the program content, 14 (70%) teachers indicated that the content is consistent with goals, 10 (50%) teachers indicated that the program content is understandable by teachers and students and 11 (55%) teachers indicated that the program content allows students to develop alternative solutions for the problems for the content.

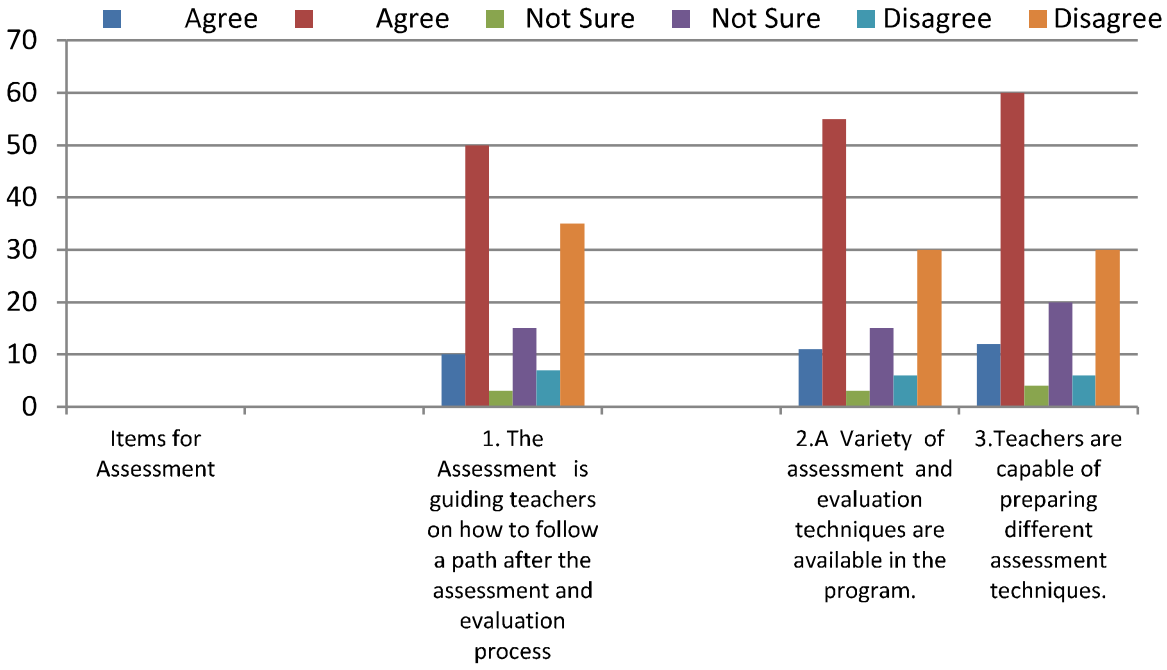


Figure2. Items that Have Highest Percentage in the Content of the Math Curriculum

Table 4. Items that Have Highest Percentage (%) Teaching – Learning Dimension of the Math Curriculum

Items for Teaching – Learning	Agree		Not Sure		Disagree	
	(f)	(%)	(f)	(%)	(f)	(%)
1. The program aimed students to participate actively in the courses.	8	40	2	10	10	50
2. Teaching – Learning activities in the Program are clear and understandable.	10	50	2	10	8	40
3. Teaching – Learning process in the program is leading for teachers in teaching the course.	10	50	2	10	8	40
4. Teaching – Learning process in the program is consistent with targeted goals.	9	45	5	25	6	30

As seen in Table 4, 10 (50%) teachers of 20 math teachers indicated that the program did not aim students to participate actively in the class, 10 (50%) teachers indicated that teaching – learning activities in the program is clear and understandable, 10 (50%) teachers indicated that teaching – learning process in the program is leading for teachers for teaching the class and9 (45%) teachers indicated that teaching – learning process in the program is consistent with the targeted goals for the teaching – learning dimension.

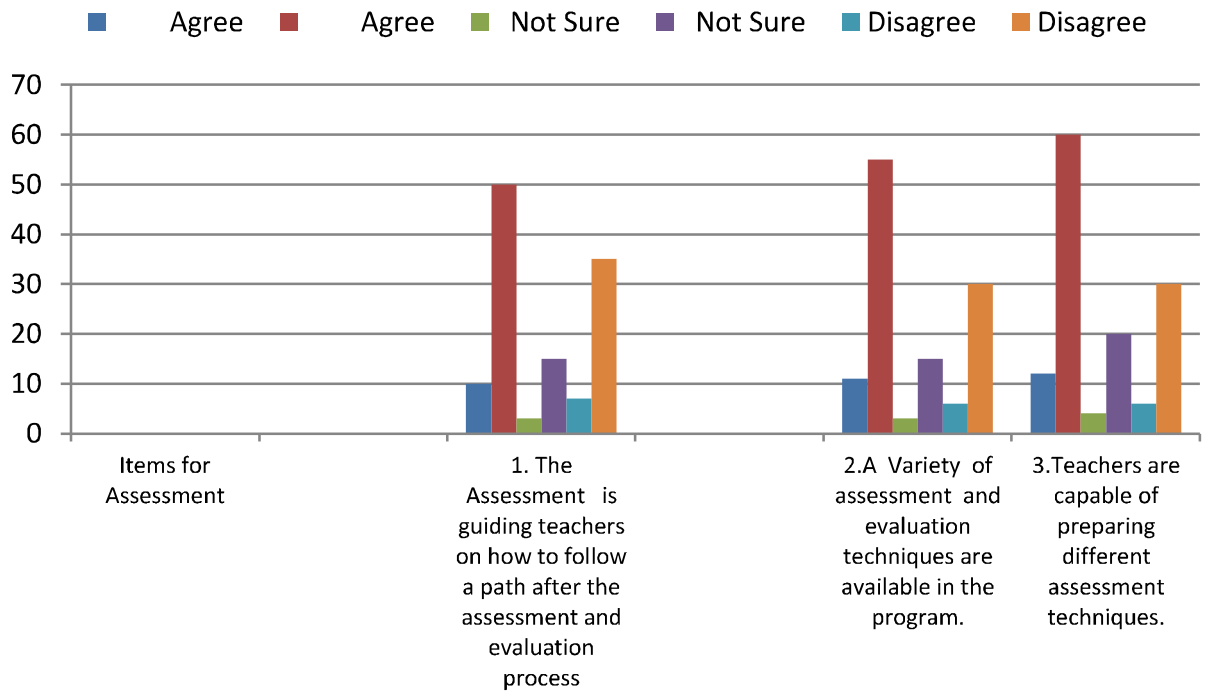
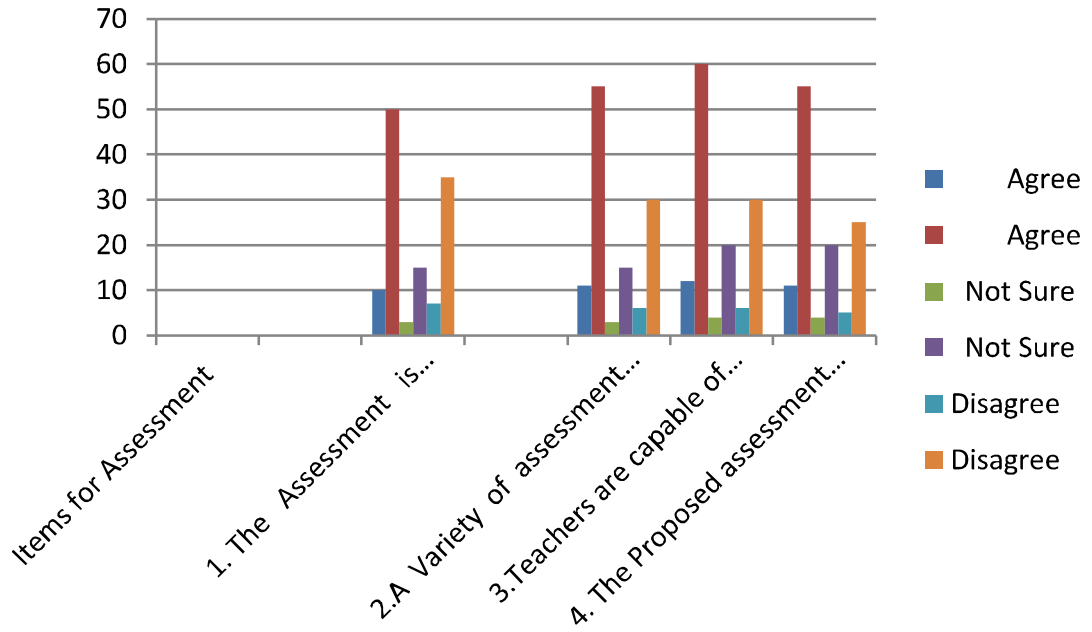


Figure 3. Items that Have Highest Percentage (%) Teaching – Learning Dimension of the Math Curriculum

Table 5. Items that Have Highest Means in the Evaluation Dimension of the New Math Curriculum

Items for Assessment	Agree		Not Sure		Disagree	
	(f)	(%)	(f)	(%)	(f)	(%)
1. The Assessment is guiding teachers on how to follow a path after the assessment and evaluation process	10	50	3	15	7	35
2.A Variety of assessment and evaluation techniques are available in the program.	11	55	3	15	6	30
3.Teachers are capable of preparing different assessment techniques.	12	60	4	20	6	30
4. The Proposed assessment processes are understandable and clearly expressed.	11	55	4	20	5	25

As seen in Table 5, 10 (50%) teachers of 20 math teachers participated in the study indicated that the assessment is guiding teachers on how to follow a path after the assessment and evaluation process, 11 (55%) teachers indicated that various assessment and evaluation techniques are available in the program,12 (60%) teachers indicated that teachers are capable of preparing different assessment and evaluation techniques and 11 (55%) teachers indicated that the proposed assessment and evaluation techniques are clear and understandable for the assessment dimension of the curriculum.



5. Discussion

When it comes the Demographic information of math teachers participating in the study; The study found that 3(15%) participants are female and 17(85%) participants are male. When

participants' teaching experience was examined, it is observed that participants fall intensely in the range of 6-10 years (35%). While 6 (30%) participants teach in 5th grade, 6 (30%) participants teach in 6th grade, 4 of them (20%) teach in 7th grade and 6 (40%) participants teach in 8th grade. While 16 (80%) participants received in-service training,4 (20%) participants did not.17(85%) participants graduated from Faculty of education and 3 (15%) participants graduated from other Faculty.As seen in Table 2, 15 (75%) of 64 math teachers indicated that goals are clear and understandable, 14 (70%) math teachers indicated that goals are consistence,11(55%) math teachers indicated that goals are not accordance with student levels and 13 (65%) teachers indicated that goals are relevant for the general objectives of the program for goals. As seen in Table 3, 9(45%) teachers of 20 math teachers participated in the study indicated that concrete examples were not given in the program content, 14 (70%) teachers indicated that the content is consistent with goals, 10 (50%) teachers indicated that the program content is understandable by teachers and students and 11 (55%) teachers indicated that the program content allows students to develop alternative solutions for the problems for the content. As seen in Table 4, 10 (50%) teachers of 20 math teachers indicated that the program did not aim students to participate actively in the class, 10 (50%) teachers indicated that teaching – learning activities in the program is clear and understandable, 10 (50%) teachers indicated that teaching – learning process in the program is

leading for teachers for teaching the class and9 (45%) teachers indicated that teaching – learning process in the program is consistent with the targeted goals for the teaching – learning dimension.

Overall evaluation, the goals of the mathematics curriculum at 5th, 6th, 7th and 8th grades are consistence and relevant for the general objectives of the program for goals, but they are not accordance with student levels The goals of the mathematics curriculum at 5th, 6th, 7th and 8th grades are mostly at the level of perception. Goals addressing implementation as well as perception are also included in the curriculum. The teachers who have examined the curriculum at each grade have expressed that some of the goals are at the level of perception and implementation simultaneously and they have added that this does not comply with the principle of writing a goal which prescribes that: *"The goals should be comprehensive but also limited at the same time. While the goals should express a group of behaviors on one side, they should also refer to a single quality on the other side. »*

The contents of the mathematics curriculum at 5th, 6th, 7th and 8th grades; concrete examples were not given in the program content, and the content is consistent with goals,the program content is understandable by teachers and students and the program content allows students to develop alternative solutions for the problems for the content.

The Teaching-Learning of the mathematics curriculum at 5th, 6th, 7th and 8th grades; the program did not aim students to participate actively in the class, teaching – learning activities in the program is clear and understandable, teaching – learning process in the program is leading for teachers for teaching the class and teaching – learning process in the program is consistent with the targeted goals for the teaching – learning dimension.

The Assessment of the mathematics curriculum at 5th, 6th, 7th and 8th grades is guiding teachers on how to follow a path after the assessment and evaluation process, various assessment and evaluation techniques are available in the program, teachers are capable of preparing different assessment and evaluation techniques and the proposed assessment and evaluation techniques are clear and understandable for the assessment dimension of the curriculum.

6. Conclusion

The study examined the perceptions of mathematics teachers regarding the newly implemented mathematics curriculum in upper primary grades. According to the teachers, while the goals of the curriculum are in compliance with the activities, the number of activities and examples provided are not sufficient. The teachers suggest that the examples should be designed to improve students' imagination, and the activities should be related to daily life experiences. The study emphasizes that the curriculum aims to develop mathematical literacy, including basic

math concepts, mathematical language, problem-solving, and other skills. The teachers recommend that the evaluation process should focus on implementation rather than memorization and should assess applicable information. They suggest that teaching mathematics should use visual and concrete means to deepen learning and facilitate the solving of real-life problems. The study highlights the importance of integrating different methods of evaluation to prevent malfunctions in the implementation of the curriculum. The teachers emphasize that the updated curriculum should support students' multidimensional development and promote the transition from passive to active learners in society.

7. Recommendations

1. The curriculum goals should be comprehensive yet limited, expressing a group of behaviors while also referring to a single quality.
2. The curriculum contents should be associated with daily life and taught in a more concrete and enjoyable manner.
3. The curriculum should emphasize mathematical thinking, reasoning, problem-solving, attitudes, values, and other necessary skills for mathematical literacy.
4. The number of activities and examples provided should be increased, with examples designed to improve students' imagination.

5. Activities should be prepared in line with implementation and daily life.
6. The evaluation process should focus on implementation rather than memorization, assessing applicable information rather than just memorization.
7. Different evaluation methods, such as oral and written exams, observations, discussions, interviews, presentations, experiments, exhibits, projects, files of development and improvement, self-evaluation, and peer evaluation, should be integrated to prevent malfunctions in curriculum implementation.
8. It is important to adopt and implement the curriculum effectively, requiring patience and effort from all stakeholders of education. Future studies should analyze the curriculum at each grade separately, gathering more detailed data and receiving the opinions of curriculum development specialists and teachers. Students' opinions about how mathematics lessons are implemented can also provide data related to any mistaken or insufficient aspects of the curriculum.

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