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| RESEARCH ARTICLE

Academic Performance and Attitudes toward Mathematics Challenge of Junior High School Students

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| ABSTRACT
The Mathematics Teachers Association of the Philippines, Inc. (MTAP) was organized to serve as an appropriate venue where mathematics teachers can come together, interact with one another, and share each other's expertise in pursuing excellence in mathematics education. This research aimed to determine the mathematics performance of the MTAP attendee and non-MTAP attendee and their attitude towards mathematics as to anxiety, confidence, enjoyment, benefits, and value of Grade 7 in the three identified high schools in Mandaue City, Philippines, as a basis for an action plan. This study used 267 randomly selected Grade 7 students from the selected high schools. A survey questionnaire was used to get the data of the respondents as to their attitude towards mathematics as to anxiety, confidence, enjoyment, benefits, and value, and an MTAP-DepEd Math Challenge and Algebra Test Questionnaire was used to assess their mathematics academic performance. The gathered data were statistically treated using frequency, percentage, weighted mean, standard deviation, and Chi-square test of independence. The results revealed that MTAP participants performed well in terms of their attitudes toward mathematics and written questions. Thus, the MTAP program improves students' academic performance in mathematics. As a result, this study recommends the implementation of the action plan.

| KEYWORDS

Teaching Mathematics, academic performance, attitudes, descriptive study, Philippines.

| ARTICLE INFORMATION

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1. Introduction

The student's performance in MTAP allowed them to be more proactive in mathematics, and it was the basis for us teachers in choosing our contestants during the competition. These also provided the latest techniques in mathematics to the youngsters and fed them to improve their knowledge to find a place for them in the competitive world. These organizations were working in the public interest in mathematics education to support and enhance the quality of the community's scientific work, raise literacy, develop standards and policies about the mathematics teaching profession, and increase social awareness.

In the Philippines, the Metrobank-MTAP-Department of Education (DepEd) Mathematics Challenge was a nationwide annual competition to contribute to improving the quality of Mathematics Education in the Philippines through an awakening greater interest in mathematics among elementary and secondary school learners, encouraging learners to strive for excellence in mathematics, discovering mathematical talents among the learners, developing the values of hard work, perseverance, honesty, teamwork, and sportsmanship, and providing the learners with opportunities in leadership and cooperative undertaking.

Some factors may also affect the students' poor performances, like the given time could be more appropriate for the given competencies, which was also difficult for teachers and students. There are too many competencies to cover, but less time for

learning contributes to more difficulties for students learning mathematics. Especially in these challenging times when no face-to-face learning happened, the mode of delivery and learning made it more difficult for students to learn mathematics. These pandemics also affected the students' learning and led them to independent learning, which is less effective than classroom-based learning. Students become more dependent on Google sites to answer their activities. Because of these, students became more likely to have difficulty learning mathematics, leading to poor performance.

However, in the Schools Division of Mandaue City in the Philippines, students' performance in the annual Metrobank-MTAP-DepEd Mathematics Challenge showed a bleak picture in both written and oral phases. A performance review made by the researcher revealed that students found the subject difficult to comprehend. Hence, performance improvement among the students in the subject was a challenge facing most school mathematics teachers. Moreover, it was hypothesized that poor student performance in mathematics could be attributed to personal and professional factors among mathematics teachers in the school.

Imbued with the above premise, this study was conducted to identify the mathematics academic performance of Grade 7 Junior High School students in Mandaue City's MTAP program and test its effectiveness in improving students' performance.

2. Literature Review

This study is anchored on the Cognitive Learning Theory (Piaget, 1936), Constructivism Theory (Bruner, 1990), and Self-Efficacy Theory (Bandura, 1977). Also, this is supported by legal bases: Republic Act No. 10533 (Enhanced Basic Education Act of 2013), DepEd Order No. 36, series 2016 (Policy Guidelines on Awards and Recognition for the K-to-12 Basic Education Program), DepEd Regional Memo No. 687, series 2019 (2020 Metrobank-MTAP-DepEd Math Challenge), and DepEd Advisory No. 12, series of 2021 (Invitation to Join International Mathematics Competition in Partnership with Math Olympiad's Training League).

The Cognitive Learning Theory of Jean Piaget (1936) explains how a child constructs a world's mental model. Piaget disagreed that intelligence was a fixed trait and regarded cognitive development as a process due to biological maturation and environmental interaction (Rosales et al., 2022). Piaget was the first psychologist to undertake comprehensive observational studies of children's cognition, analyze cognitive development methodically, and create a set of straightforward yet clever tests to identify various cognitive capacities (Niv, 2021).

A humanistic approach to education emphasizes individual development and growth more than the mechanical modification of behavior (Misra & Misra, 2021; Treve, 2021). Humanistic learning theory provides the groundwork for the three main "foundational" theories of adult learning that arose during this period: andragogy, self-directed learning, and transformational learning (Merriam & Baumgartner, 2020). Every theory or framework has a corresponding teacher who seeks to distinguish between the features of adult learning and those of child learning (Lutta, 2021). All theories possess a strong research foundation and have endured mostly over time (Clark et al., 2021).

The process of creating concepts, designs, and plans is known as conceptualization. A framework offers a frame of reference for clinical practice, research, and teaching by organizing concepts according to their applicability and research challenges. The models' philosophies and presumptions are reflected in theoretical and conceptual frameworks, providing general knowledge of the phenomena of interest (De Haas, 2021). The model directs research design, data collection, and interpretation of findings. This method of learning was active, constructive, and long-lasting (Connaway & Radford, 2021).

According to Fries et al. (2021), for students' skills to fundamentally vary, they must comprehend the nature of expert practice and develop instructional strategies suited for teaching that activity. Understanding the techniques and why they are probably successful is essential to traditional apprenticeship. Cognitive apprenticeship teaching techniques expose students to these implicit processes so they may watch, play out, and practice them with guidance from their teacher and other students. Two critical distinctions exist between cognitive and traditional apprenticeship, focusing on mental and metacognitive abilities (de Bruin, 2019).

One of the most important things is education, which helps people acquire the necessary information, skills, and talents and promotes the general development and advancement of the person, society, and country (Babatunde et al., 2021). Not only can an educated individual achieve their intended goals and ambitions, but they can also effectively contribute to the community's well-being. Learning and academic performance enhance individuals' academic knowledge, skills, abilities, and proficiency (Hadiyanto et al., 2021).

Learning techniques support students in making connections between previously taught material and what they have retained in their long-term memory (Oakley & Sejnowski, 2021). Three broad categories may be used to group learning strategies: organization, meaning expansion, and review (repeat) (Hanelt et al., 2021).

Academic success requires appropriate learning methodologies, balanced self-confidence, and anxiety release. Nonetheless, Rasouli et al. (2018) assert that a lack of study skills, a decrease in desire for learning, poor organization, and incorrect information processing are all contributing factors to academic failure, not just high test anxiety levels.

Teachers can learn about the cognitive, metacognitive, affective, and motivational traits of self-regulated learners and strategies for encouraging self-regulated learning in their students (Vosniadou et al., 2021). Giving students time to work on productive projects alone or with peers is one of these, as is equipping them with the skills and information necessary to effectively manage their learning and keep their motivation and emotions in check while finishing these assignments (Wen, 2021).

Another theoretical support is the Constructivism Theory. In constructivist learning theory practice, learners are self-directed and construct knowledge via personal experiences, while the teacher should act as a mentor (Peteros et al., 2019). However, according to social learning theory, the teacher is a role model to learners, who learn through vicarious experiences in a social context. Social interaction and human relations are two significant components in applying these two adult learning theories in adult learning and vocational training settings. An application matrix of constructivist and social learning theories was developed for teachers' and training professionals' practice (Chuang, 2021).

Sulistyowati (2019) examines exercises that may be used to improve listening comprehension in the context of real-world learning using a constructivist teaching methodology. The learning exercise will be built on Constructivism's ideas, which see learning as an active process in which students create knowledge rather than passively absorbing it.

Constructivism is a learning philosophy that holds that humans create knowledge. These ideas and approaches are crucial to education to develop high-quality human resources (Fatimah et al., 2022). Le (2018) explained that constructivist learning theory underpins various student-centered teaching methods and techniques, contrasting with traditional education, whereby teachers passively transmit knowledge to students. The teacher's primary job was to create a collaborative problem-solving environment where students actively participate in their learning (Magaji, 2021).

The fundamental tenet of Constructivism is that humans form knowledge and that information is built upon prior knowledge (Lee et al., 2021). Their past knowledge influences an individual's construction of new or modified information from fresh learning situations. The second idea is that education is active as opposed to passive. The passive teaching approach sees the student as "an empty vessel" that has to be filled with information. Conversely, Constructivism holds that students can only create meaning by actively engaging with the outside world via tasks like experiments and real-world problem-solving. While knowledge can be acquired passively, comprehension necessitates the creation of significant links between existing knowledge, newly acquired knowledge, and the learning processes (Soliman et al., 2021).

A person's unique collection of beliefs that dictate how successfully they can carry out a plan of action in potential scenarios is known as their self-efficacy (Ritchie et al., 2021). In simpler terms, self-efficacy defines a person’s belief in their ability to succeed in a particular situation (Malureanu et al., 2021). Rieder et al. (2021) believed that self-efficacy also involves determination and perseverance, as it helps one overcome an obstacle that would interfere with utilizing those innate abilities to achieve goals. Put more simply, self-efficacy is the belief in one's ability to achieve certain goals using one's talents in specific situations. Pearman et al. (2021) believe self-efficacy also involves determination and perseverance. Overcome an obstacle that would interfere with utilizing those innate abilities to achieve goals. More simply, self-efficacy is the belief that one can use one's talents to attain a goal in a given situation. It has been proposed that self-efficacy is task-specific self-esteem (Asika, 2021). Self-efficacy theory is based on the idea that people are more likely to participate in activities for which they have a high level of self-efficacy and less likely to participate in activities they do not (Yang et al., 2021).

To provide Filipino students with the skills and competencies necessary to meet the demands of the twenty-first century, DepEd adopted Republic Act No. 10533, generally known as the "Enhanced Basic Education Act," or the K–12 Program (Mirasol et al., 2021). In support of the K-to-12 program, the 10-point agenda was the continuous improvement of the primary education system (Sannadan & Lang-ay, 2021). Despite significant access improvements, DepEd was also geared toward achieving quality primary education (Manire, 2021). This declaration of commitment aligns with the objectives under Sustainable Development Goal (SDG) 4: Quality Education. Assessment plays a vital role in determining the quality of primary education.

In the K-to-12 program context, assessment results will be used to investigate the learners' performance and introduce relevant and responsive policies to improve further teaching and learning quality (Albay & Eisma, 2021). One of the initiatives for assessing performance was the DepEd's participation in international large-scale assessments, aiming to achieve the following purposes outlined in DepEd Order No. 29, s. 2017 (Policy Guidelines on System Assessment in the K-to-12 Basic Education Program).

In line with the implementation of Republic Act No. 10533 on the Enhanced Basic Education Act of 2013 (K-to-12 Law), DepEd is adopting the enclosed DepEd Order No. 36, series 2016 entitled, Policy Guidelines on Awards and Recognition for the K-to-12 Basic Education Program. These honors are intended to publicly acknowledge students' exceptional performance and accomplishment in leadership, social responsibility, and academics, among other areas of their growth and development (Castillo, 2020). These awards encourage learners to strive for excellence and become proactive members of the school and community. To foster Filipino learners' development, it is critical to transition away from valuing academic performance based on high grades to appreciating and celebrating a wide range of student achievements (Ridwan, 2021). The awards are intended to publicly honor student accomplishments that inspire students to pursue success in academics, leadership, and social responsibility and acknowledge and encourage student brilliance in various disciplines (Siegle, 2021).

Effectively, the policy pushes every student to accomplish activities essential to their classroom and workplace success. As a result, the policy will support all students and urge them to take an active role in their school and community. DepEd Regional Memo No. 687, series 2019 (2020 Metrobank-MTAP-DepEd Math Challenge), since it is refounding, with the Lord leading the way through events, circumstances, and people, the MTAP has progressed without fanfare, from one successful project to another workshops of different kinds, talks given and papers delivered. Among the projects well-known throughout the country are the Metrobank-MTAP-DepEd Math challenge and the MTAP-DepEd Saturday programs of excellence for regular and talented students. The initiative aims to guarantee that as many people as possible participate in raising the standard of mathematics education in the nation and igniting students' interest in the subject (Sagge Jr. et al., 2022). It also challenges the learners to strive for mathematical excellence and empowers their mathematical talents with awards and recognitions to serve as models to the youth (Lecaros & Odejar, 2022).

DepEd Advisory No. 12, series of 2021 (Invitation to Join International Mathematics Competition in Partnership with Math Olympiad's Training League). The Math Olympiad's Training League invites learners from public and private schools to participate in the following online international competitions by its partners (de Losada & Taylor, 2022). Its activities aim to promote mathematics to learners and schools by enabling them to engage in mathematics training sessions and competitions. Also, it organizes math training programs for different learners based on their mathematical skills and abilities (Ucang & Limjap, 2021). Participation in public and private schools shall be subject to the no-disruption-of-classes policy. Section 3 of Republic Act No. 5546's no-collection policy also applies.

According to Hamid and Kamarudin's (2021) study, the experimental groups' test results for mathematical performance varied significantly. The study also found no significant gender difference in the mathematics performance test. Critical Thinking Skills were also an effective means of enhancing students' understanding of Mathematical concepts.

According to Hwang and Son (2021), the indispensable role of attitude in learning mathematics has garnered the attention of educational researchers and mathematics teachers for a long time. The study unveiled a significant relationship between teachers' and students' attitudes toward mathematics. It was realized that teachers' positive attitude radiated confidence in students, making them develop a positive attitude towards learning Mathematics. The findings supported prior research on the connection between math students' performance and teachers' perspectives. It includes a discussion of the results' implications and suggestions for practical use.

These related studies and literature contributed to formulating the underlying variables relative to the student's performance in MTAP.

3. Methodology

This section presents the study's design, environment, respondents, the instruments used to gather the quantitative data, and its appropriate data analysis.

3.1 Design

This study employed comparative data analysis to determine the attendees' mathematics academic performance and non-attendees of the MTAP program of Grade 7 junior high school students. It was categorized based on the Standards-Based Assessment: DepEd's Perspective description of ratings. The design means you can see some treatment's effects on a group.

3.2 Environment

The study was conducted in the three identified public national high schools in the Philippines: Mandaue City Comprehensive National High School, Mandaue City Science High School, and Cabancalan National High School. These identified schools are among the top schools in Metrobank-MTAP DepEd Math Challenge Division Finals Qualifiers and top-scoring schools at both the

public and private secondary schools in Mandaue City, Philippines. These schools were chosen using a purposive sampling technique.

3.3 Respondents

This study employed the Grade 7 junior high schools enrolled in the 2020-2021 school year. Table 1 shows the respondents used in the study.

Table 1
Distribution of Respondents

School	Students Enrolled			MTAP Participants			Non-MTAP Participants		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Cabancalan NHS	54	48	102	19	28	47	35	20	55
Mandaue City Comprehensive NHS	55	50	105	21	27	48	34	23	57
Mandaue City ScienceHS	26	34	60	20	26	46	6	8	14
Total	**135**	**132**	**267**	**60**	**81**	**141**	**75**	**51**	**126**

The table shows 141 MTAP participants, 52.81% of the total respondents, and 126 non-MTAP participants [47.19%]. It revealed more MTAP participants than non-MTAP participants in the study. These participants were chosen using a purposive sampling technique, in which the participants joined the Metrobank-MTAP DepEd Math Challenge.

3.4 Instrument

Three instruments were used in this study. The first tool, the Fennema-Sherman Attitudinal Test, used a 40-item questionnaire to collect respondents' profiles and attitudes about mathematics. The MTAP-DepEd Math Challenge Questionnaire, which was adapted from the MTAP-DepEd Math Challenge questionnaire, was used as the second instrument to collect pupils' performance in mathematics. Using the Standardized Algebra Test developed by Tobey and Slater, the third instrument collected the students' mathematical performance.

3.5 Data Analysis

Both descriptive and inferential statistics are computed using the Minitab statistical software. The primary users of this new program are researchers who process crucial data in short, easy stages. This application is capable of managing information well using certain tactics. These techniques are used to examine, change, and produce a unique pattern among a number of factors. The average score of MTAP attendees and non-attendees was used to quantify the variables taken into consideration in this study. Utilizing frequency, simple percent, mean, and standard deviation, the data collected from the profiles of both program participants and non-participants were analyzed. Weighted mean and standard deviation were employed to evaluate the participants' and non-participants' attitudes toward mathematics. The mathematics performance of the MTAP-DepEd Math Challenge and Standardized Algebra Test participants and non-participants was assessed using frequency, simple percentage, mean, and standard deviation. A significant association was tested using the Chi-square test of independence.

3.6 Credibility and Reliability

The type of research instruments used were the standardized questionnaire adapted from the Mathematics Attitudinal Scale [Fennema-Sherman], Standardized Algebra Test [Tobey and Slater], and Math Challenge [Metrobank-DepEd MTAP]. The main objective of the survey questionnaire in research is to obtain relevant information that is most reliable and valid. The reliability of this research refers to consistency. This research is consistent in the gathered data measured over the time specified and in the fact that the data measures what we want it to. This research has different data resources, which will ensure reliability.

3.7 Ethical Considerations

Informed consent is required from participants in accordance with ethical requirements for conducting research with human subjects. The questionnaires could only be distributed by the respective school heads. Also obtained from the intended responders was their informed consent. The intended respondents were told of the study's scope and that their responses and identities would remain confidential. Every target responder agreed to actively engage in the study by providing their consent.

4. Results and Discussion

4.1 Profile of the Respondents

The students' profile consists of their age, gender, final grade in grade 6 mathematics, and the type of schools they graduated from. The table presents the results of the profile of the participants and non-participants of the MTAP program.

Table 2
Profile of the Respondents

Profiles		Participant [n = 141] f	%	Non-Participant [n = 126] f	%	Combined [N = 267] f	%
A. Age [in years]							
12		52	36.88	51	40.48	103	38.58
13		86	60.99	64	50.79	150	56.18
14		3	2.13	9	7.14	12	4.49
15		0	0.00	2	1.59	2	0.75
	Mean:	12.65		12.70		12.68	
	St. Dev:	0.52		0.67		0.60	
B. Gender							
Female		81	57.45	51	40.48	132	49.44
Male		60	42.55	75	59.52	135	50.56
C. Average Final Grade in Grade 6 Math							
75 – 79		3	2.13	30	23.81	33	12.36
80 – 84		14	9.93	49	38.89	63	23.60
85 – 89		62	43.97	33	26.19	95	35.58
90 – 100		62	43.97	14	11.11	76	28.46
	Mean:	88.86		83.51		86.19	
	St. Dev:	4.06		4.45		4.26	
D. Type of Schools Graduated							
Private		9	6.38	14	11.11	23	8.61
Public		132	93.62	112	88.89	244	91.39

Age and Gender. The table shows that most participants are 13 years old [86, 60.99%], with a mean age of 12.65 and a standard deviation of 0.52. The data imply that more students aged 13 are both MTAP and non-MTAP participants, which is appropriate for their grade level. Also, the table shows that about 64 respondents [50.79%] are non-MTAP participants aged 13.

In terms of their gender, the table shows that there are more female MTAP participants [81, 57.45%] than male MTAP participants [60, 42.55%]. Also, the table shows more male non-MTAP participants [75, 59.52%] than females [51, 40.48%]. The findings imply that the increase in female competitors in MTAP represents a paradigm shift challenging the traditional gender disparities in mathematics contests.

This change suggests that society is beginning to acknowledge the variety of skill sets and aptitudes that women possess in mathematics. It draws attention to the successes of programs designed to promote diversity and challenge gender stereotypes, inspiring more women to seek and succeed in the mathematical sciences. A more diverse and egalitarian environment for mathematical accomplishments is being created, and the rise in female involvement in MTAP is a good start in that direction.

Average Final Grade in Grade 6 Mathematics. As for their average final grade in Grade 6 mathematics, more MTAP participants have an average grade range from 85 to 89 [43.97%] and 90 to 100 [43.97%]. Also, it shows that MTAP participants got a mean grade in Grade 6 mathematics of 88.86 and a standard deviation of 4.06. The non-MTAP participants have an average range of 80 to 84 [49, 38.89%]. It gained a mean of 83.51 and a standard deviation of 4.45. Based on the combined number of respondents from MTAP and non-MTAP participants, more respondents have an average range from 85-89 with 95 respondents [35.58%]. It shows a mean grade of 86.19 and a standard deviation of 4.26. The data imply that the range of grades shows a solid foundation and grasp of fundamental concepts. Teachers can use these data to identify effective teaching methods supporting students' learning. Teachers may consider implementing personalized learning tactics to satisfy each student's learning needs and provide a supportive learning environment.

Type of School Graduated in the Elementary. Most respondents [244, 91.39%], both MTAP and non-MTAP participants,

graduated from public schools. Therefore, MTAP participants have a higher average grade than non-MTAP participants, which means that the MTAP program contributes to students' exemplary performance in mathematics.

4.2 Level of Attitudes of the Respondents Toward Mathematics

This section categorizes the respondents' attitudes toward mathematics into a] Anxiety, b] Confidence, c] Enjoyment, and d] Benefits and Value.

Anxiety. Table 3 presents the respondents' attitudes towards mathematics and anxiety in the three identified schools in Mandaue City.

Table 3
Level of Attitudes of the Respondents Toward Mathematics as to Anxiety

	Indicators	Participant [n = 141]		Non-Participant [n = 126]		Combined [N = 267]	
		Mean	Int	Mean	Int	Mean	Int
A.	**Anxiety**						
1.	Working math makes me nervous.	3.42	A	4.15	A	3.79	A
2.	I get a sinking feeling when I think of learning math.	3.14	NS	3.83	A	3.49	A
3.	Learning math is very frustrating.	3.12	NS	3.77	A	3.45	A
4.	I feel insecure about asking math questions in class.	3.14	NS	3.64	A	3.39	NS
5.	I get nervous when the math teacher is in class.	2.92	NS	3.53	A	3.23	NS
	Aggregate Mean	**3.15**	**NS**	**3.78**	**A**	**3.47**	**A**

Range: 1.00-1.79 Strongly Disagree [SD]; 1.80-2.59 Disagree [D]; 2.60-3.39 Not Sure [NS]; 3.40-4.19 Agree [A]; 4.20-5.00 Strongly Agree [SA]

The results imply that the level of attitude of the MTAP participants toward mathematics is anxiety. The indicator I get nervous when the math teacher is in class has the lowest mean (2.92, Not Sure). While the indicator, Working math makes me anxious, has the highest mean (3.42, Agree). With regards to the non-MTAP participants towards mathematics anxiety, the indicator, I get nervous when math teacher is in class, has the lowest mean (3.53, Agree). While the indicator, Working math makes me anxious, got the highest mean (4.15, Agree).

As a result of the combined respondent's attitudes towards mathematics as to anxiety, the indicator, I get nervous when math teacher is in class, has the lowest mean (3.23, Not Sure). While the indicator, Working math makes me anxious, has the highest mean (3.79, Agree).

According to data from combined MTAP and non-MTAP participants, students generally indicated that working with arithmetic makes them anxious. Given that the theoretical reaction might impair cognitive processes and significantly impact academic progress, it is implied that students' worry over math homework reveals a fundamental aspect of mathematics. Teachers should be conscious of this emotion and respond to it by employing strategies that lessen the fear associated with arithmetic. Outside of the classroom, the impacts impact people's general well-being and ability to learn crucial problem-solving skills.

Confidence. Table 4 presents the respondents' attitudes towards mathematics and confidence in the three schools.

Table 4
Level of Attitudes of the Respondents Toward Mathematics as to Confidence

	Indicators	Participant [n = 141]		Non-Participant [n = 126]		Combined [N = 267]	
		Mean	Int	Mean	Int	Mean	Int
B.	**Confidence**						
1.	Math does not scare me at all.	3.02	NS	3.60	A	3.31	NS
2.	I have self-confidence in learning math.	3.31	NS	3.52	A	3.42	A
3.	I have Confidence in taking a math test.	3.14	NS	3.63	A	3.39	NS
4.	I can solve math problems within a given time.	3.16	NS	3.52	A	3.34	NS
5.	I can solve math problems without difficulty.	3.00	NS	3.37	NS	3.19	NS
6.	I have Confidence in asking math questions in class.	3.28	NS	3.44	A	3.36	NS
7.	I can answer math questions in class.	3.39	NS	3.63	A	3.51	A
	Aggregate Mean	**3.19**	**NS**	**3.53**	**A**	**3.36**	**NS**

Range: 1.00-1.79 Strongly Disagree [SD]; 1.80-2.59 Disagree [D]; 2.60-3.39 Not Sure [NS]; 3.40-4.19 Agree [A]; 4.20-5.00 Strongly Agree [SA]

The table shows the MTAP participants' attitudes towards mathematics and Confidence. The indicator that I can solve math problems without difficulty has the lowest mean (3.00, Not Sure), while the indicator that I can answer math questions in class has the highest mean (3.39, Not Sure). Regarding the non-MTAP participants' Confidence in mathematics, the indicator is that I can solve math problems without difficulty, which has the lowest mean (3.37, Not Sure). While the indicators showed that I have confidence in taking math tests and can answer math questions in class, I got the highest mean (3.63, Agree).

As a result of the combined respondents' attitudes towards mathematics as to Confidence, the indicator that I can solve math problems without difficulty has the lowest mean (3.19, Not Sure). While the indicator, I can answer math questions in class, has the highest mean (3.51, Agree).

Students responding to mathematical problems in class offer a rich data environment with broad ramifications. Every correct answer is a data point that helps to piece together their understanding. Teachers may use these data to identify proficiency patterns, allowing them to create individualized learning plans and focused interventions. Achievements serve as rays of hope, fostering a supportive educational atmosphere. Furthermore, the data imply that transformational rather than just evaluative, directing teaching tactics and encouraging flexibility. Students gain Confidence when they see their progress via this data lens, and this leads to a symbiotic connection where mastery enhances the data narrative of student success and data reveal the route to mastery.

Enjoyment. Table 5 presents the respondents' attitudes towards mathematics and enjoyment in the three identified schools.

Table 5
Level of Attitudes of the Respondents Toward Mathematics as to Enjoyment

	Indicators	Participant [n = 141]		Non-Participant [n = 126]		Combined [N = 267]	
		Mean	Int	Mean	Int	Mean	Int
C.	**Enjoyment**						
1.	I enjoy doing math.	3.22	NS	3.58	A	3.40	A
2.	Math word problems fascinate me.	3.18	NS	3.64	A	3.41	A
3.	I look forward to a math class.	3.31	NS	3.82	A	3.57	A
4.	Math is exciting to me.	3.40	A	3.87	A	3.64	A
5.	I enjoy learning math with my friend.	3.65	A	3.95	A	3.80	A
6.	I feel comfortable working on math problems.	3.42	A	3.63	A	3.53	A
	Aggregate Mean	**3.36**	**NS**	**3.75**	**A**	**3.56**	**A**

Range: 1.00-1.79 Strongly Disagree [SD]; 1.80-2.59 Disagree [D]; 2.60-3.39 Not Sure [NS]; 3.40-4.19 Agree [A]; 4.20-5.00 Strongly Agree [SA]

Table 5 shows the level of attitudes of the MTAP participants towards mathematics as enjoyment. The indicator, Math word problem fascinates me, has the lowest mean (3.18, Not Sure). While the indicator, I enjoy learning math with my friend, has the highest mean (3.65, Agree). Regarding the non-MTAP participants towards mathematics enjoyment, the indicator, I enjoy doing

math, has the lowest mean (3.58, Agree). While the indicator, I enjoy learning math with my friend has the highest mean (3.95, Agree).

As a result of the combined respondents' attitudes towards mathematics as to enjoyment, the indicator, I enjoy doing math, has the lowest mean (3.40, Agree). While the indicator, I enjoy learning math with my friend, has the highest mean (3.80, Agree).
The data suggest that students find math more enjoyable when learning it with peers, supporting the idea that teaching math collaboratively works. Based on the findings, showcasing the enjoyment students derive from learning math with their friends highlights the positive impacts of social interaction on the learning process. This connection fosters the development of cooperative problem-solving skills and increased engagement. Teachers can utilize this information to plan group projects that provide a healthy atmosphere for peer learning. Schools may encourage comprehension and student participation by integrating social elements into math education. Beyond affecting students' aptitude for solving mathematical puzzles, the impact also affects their perception of learning in general.

Benefits and Value. Table 6 presents the respondents' attitudes towards mathematics and anxiety in the three identified schools.

Table 6
Level of Attitudes of the Respondents Toward Mathematics as to Benefits and Value

	Indicators	Participant [n = 141]		Non-Participant [n = 126]		Combined [N = 267]	
		Mean	Int	Mean	Int	Mean	Int
D.	**Benefits and Value**						
1.	Math is essential in everyday life.	3.82	A	4.04	A	3.93	A
2.	I want to develop my math skills.	3.78	A	4.21	SA	4.00	A
3.	Math is a vital subject.	3.80	A	4.18	A	3.99	A
4.	Knowing math will help me earn a living.	3.81	A	4.37	SA	4.09	A
5.	I will need math for my future work.	3.87	A	4.44	SA	4.16	A
6.	Math helps people to make good decisions.	3.75	A	4.39	SA	4.07	A
7.	Math improves my thinking capacity.	3.87	A	4.27	SA	4.07	A
8.	Math is essential for other subjects.	3.71	A	4.42	SA	4.07	A
	Aggregate Mean	**3.80**	**A**	**4.29**	**SA**	**4.05**	**A**

Range: 1.00-1.79 Strongly Disagree [SD]; 1.80-2.59 Disagree [D]; 2.60-3.39 Not Sure [NS]; 3.40-4.19 Agree [A]; 4.20-5.00 Strongly Agree [SA]

The table revealed the level of attitudes of the MTAP participants towards mathematics in terms of benefits and value. The indicator, Math, is essential for other subjects and has the lowest mean (3.71, Agree). While the indicators show that I will need math for my future work, math improves my thinking capacity and has the highest mean (3.87, Agree).

The non-MTAP participants' views on mathematics as benefits and value indicate that math is essential in everyday life and has the lowest mean (4.04, Agree). Meanwhile, the indicator that I will need math for my future work has the highest mean (4.44, Strongly Agree).

As a result of the combined respondents' attitudes towards mathematics as to benefits and value, the indicator, Math, is essential in everyday life, with the lowest mean (3.93, Agree). While the indicator, I will need math for my future work, has the highest mean (4.16, Agree).

According to the findings, students concurred that mathematics is necessary for their future employment. As a result, mathematics is highly valuable to students in their daily life. These data imply how important math is to students' future careers and emphasize how important math is to creating a workforce prepared for the workforce. This awareness suggests a comprehension of the real-world applications of mathematical knowledge. With this information, teachers may emphasize the usefulness of mathematics education and more effectively link the curriculum to the labor market demands. Schools should test innovative teaching techniques that emphasize the applicability of mathematical concepts to various careers to assist students in gaining a more profound knowledge of the subject.

Summary of the Level of Attitudes. Table 7 presents the results of the respondents' attitudes toward mathematics and anxiety in the three identified schools in Mandaue City.

Table 7
Summary Table on Level of Attitudes of the Respondents Toward Mathematics

	Indicators	Participant [n = 141]		Non-Participant [n = 126]		Combined [N = 267]	
		Mean	Int	Mean	Int	Mean	Int
A.	Anxiety	3.15	NS	3.78	A	3.47	A
B.	Confidence	3.19	NS	3.53	A	3.36	NS
C.	Enjoyment	3.36	NS	3.75	A	3.56	A
D.	Benefits and Value	3.80	A	4.29	SA	4.05	A
	Aggregate Mean	**3.38**	**NS**	**3.84**	**A**	**3.61**	**A**

Range: 1.00-1.79 Strongly Disagree [SD]; 1.80-2.59 Disagree [D]; 2.60-3.39 Not Sure [NS]; 3.40-4.19 Agree [A]; 4.20-5.00 Strongly Agree [SA]

The data summarized showed that the MTAP participants' attitudes towards mathematics, as to anxiety, had the lowest mean of 3.15 [Not Sure], and, as to benefit and value, had the highest mean of 3.80 [Agree]. Regarding non-MTAP participants, mathematics confidence has the lowest mean of 3.53 [Agree], and benefits and value have the highest mean of 4.29 [Strongly Agree].

The combined respondents' attitudes towards mathematics had the lowest mean of 3.36 [Not Sure], and benefits and value had the highest mean of 4.05 [Agree].

According to the findings, students understand the importance and advantages of mathematics in real-world situations. These data imply that students' comprehension of the value and need of learning mathematics in real-world situations points to a fundamental change in perspective. This insight demonstrates the practical applications of mathematical concepts outside of the classroom and aids in students' understanding of such applications.

4.3 Mathematics Performance of the Respondents

This section presents the mathematics performance in MTAP and its performance in algebra. Table 8 presents the results of the respondents in the MTAP-DepEd Math Challenge and Algebra Test in the three identified schools.

Table 8
Mathematics Performance of the Respondents

	Indicators	Participant [n = 141]		Non-Participant [n = 126]		Combined [N = 267]	
		f	%	f	%	f	%
A.	**MTAP DepEd Math Challenge**						
	1 - 4 [Absolutely No Mastery]	4	2.84	18	14.29	22	8.24
	5 - 9 [Low Mastery]	8	5.67	39	30.95	47	17.60
	10 - 14 [Average Mastery]	22	15.60	38	30.15	60	22.47
	15 - 19 [Closely App. Mastery]	62	43.97	22	17.46	84	31.46
	20 - 24 [Mastered]	45	31.91	9	7.14	54	20.22
	Mean:	16.84		10.41		13.63	
	St. Dev:	4.60		6.08		5.34	
B.	**Algebra Test**						
	0 - 3 [Poor]	6	4.26	25	19.84	31	11.61
	4 - 7 [Less Proficient]	7	4.96	33	26.19	40	14.98
	8 - 11 [Proficient]	14	9.93	32	25.40	46	17.23
	12 - 15 [Very Proficient]	45	31.91	20	15.87	65	24.34
	16 - 20 [Excellent]	69	48.94	16	12.70	85	31.84
	Mean:	14.53		8.29		11.41	
	St. Dev:	4.82		5.63		5.23	

MTAP-DepEd Math Challenge. For the MTAP DepEd Math Challenge, specifically the MTAP participants, the table shows the raw score of 15 to 19 [Closely App. Mastery] got the highest frequency of 62 [43.97%]. Among the non-MTAP participants, most respondents scored higher in the raw score of 5 to 9 [39, 30.95%], which means Low Mastery. When the researchers combined the MTAP and non-MTAP participants, the table shows that most respondents got the highest score of 15 to 19 [Closely App. Mastery] with frequency of 84 [31.46%].

The data imply that the students scored better on those who are MTAP participants than non-MTAP participants. There are essential educational ramifications to the findings showing that students in MTAP outperformed their counterparts who did not engage in the program. It implies that participation in MTAP promotes an improvement in mathematical competency. Teachers may use this knowledge to encourage students to participate in these kinds of programs as they can improve their ability to solve problems and their mathematical understanding. If schools want to guarantee greater student participation and better academic results, they should consider making such programs more accessible. Beyond a person's achievement, the consequences highlight the value of specialized programs in developing mathematical ability and fostering a more vibrant and competitive academic environment.

4.3.1 Standardized Algebra Test

The table presents the respondents' results in the Standardized Algebra Test in the three identified schools in Mandaue City. It shows that in the Algebra test, the MTAP participants scored higher in the raw score range of 16 to 20 [69, 48.94%], which means Excellent. At the same time, the non-MTAP participants scored higher in 4 to 7 [33, 26.19%], which means they were less proficient. Also, the table shows that when the scores of the MTAP and non-MTAP participants are combined, most of them scored higher in the raw score range of 16 to 20 [85, 31.84%], which means Excellent.

The data imply that those MTAP participants perform better in the Algebra test than non-MTAP participants. The fact that MTAP participants outperformed other students in Algebra assessments highlights the benefits of specialized math programs. Also, this implies a relationship between focused educational efforts and increased algebraic skill performance. The consequences are twofold: first, they highlight the need for extracurricular activities in promoting advanced mathematics comprehension, and second, they advocate for the inclusion of compelling program aspects in the traditional curriculum. These results call for a reassessment of conventional teaching approaches and an encouragement for educators to implement creative tactics that replicate the success of MTAP participants, which will ultimately improve students' algebraic abilities in more generalized learning environments.

4.4 Test of Significance of the Relationship

The study hypothesized that the respondents' profiles significantly correlate with their attitudes toward mathematics. This study categorizes attitudes into Anxiety, Confidence, Benefits and Value, and Enjoyment. Table 9 presents the test results of the significance of the relationships between the MTAP and non-MTAP participants' overall attitudes toward mathematics and their profiles.

The table shows that the MTAP participants' overall attitudes toward mathematics correlate significantly with their average final grade in Grade 6 mathematics. The computed Chi-square value of 24.956 is considerably higher than its critical value of 21.026 at a df 12. The data imply that MTAP participants' overall attitudes towards mathematics correlate with their MTAP participants' average final grade in Grade 6 mathematics.

Table 9
Relationship Between Profile of the Respondents and the Overall Level of Attitudes Towards Mathematics (alpha = 0.05)

Overall Level	Chi-Square	df	Critical Value	Significance	Result
I. Participants					
Age	12.814	8	15.507	Not Significant	Ho Accepted
Gender	2.463	4	9.488	Not Significant	Ho Accepted
Average Final Grade in Grade 6 Math	24.956	12	21.026	Significant	Ho Rejected
School Type	4.505	4	9.488	Not Significant	Ho Accepted
II. Non-Participants					
Age	6.229	9	16.919	Not Significant	Ho Accepted
Gender	2.126	3	7.815	Not Significant	Ho Accepted
Average Final Grade in Grade 6 Math	9.430	9	16.919	Not Significant	Ho Accepted
School Type	0.489	3	7.815	Not Significant	Ho Accepted

Examining data on MTAP participants illuminates a strong correlation between their attitudes toward mathematics and academic success in Grade 6. Positive attitudes significantly influence motivation, engagement, and perseverance, achieving higher average final grades. Participants with a genuine interest in mathematical challenges approach problem-solving enthusiastically, contributing to a deeper understanding of concepts.

According to Carroll et al. (2021), teachers can leverage this insight to tailor instructional methods, fostering a positive environment that encourages active participation. Acknowledging the interplay between attitude and achievement enables educators to enhance the overall learning experience for MTAP participants, nurturing a lifelong appreciation for mathematics.

Also, the table shows that the non-MTAP participants' overall attitudes toward mathematics do not correlate significantly with their profiles. The computed Chi-square values are considerably higher than their critical values. The data imply that non-MTAP participants' overall attitudes towards mathematics do not correlate with their profiles. Information on non-MTAP participants shows a startling lack of association between demographic traits and general attitudes toward mathematics. Attitudes toward mathematics are still varied and unaffected by age, gender, the average final math grade in Grade 6, or the kind of school. This implies that developing a favorable attitude toward arithmetic might be independent of these demographic factors. Teachers must comprehend this lack of association, highlighting the necessity for individualized approaches in promoting a favorable attitude toward mathematics, regardless of individual traits or educational backgrounds.

Table 10 presents the test results of the significance of the relationships between the MTAP and non-MTAP participants' mathematics performance in MTAP and their profiles.

The table shows that the MTAP participants' mathematics performance in MTAP has a significant relationship with their average final grade in Grade 6 mathematics. The computed Chi-square value of 56.734 is significantly higher than its critical value of 24.996 at a df of 15. The data imply that MTAP participants' mathematics performance in MTAP correlates with their average final grade in Grade 6 mathematics.

Table 10
Relationship Between Profile of the Respondents and the Mathematics Performance in MTAP (alpha = 0.05)

Mathematics Performance in MTAP	Chi-Square	df	Critical Value	Significance	Result
I. Participants					
Age	8.053	10	18.307	Not Significant	Ho Accepted
Gender	5.515	5	11.070	Not Significant	Ho Accepted
Average Final Grade in Grade 6 Math	56.734	15	24.996	Significant	Ho Rejected
School Type	1.640	5	11.070	Not Significant	Ho Accepted
II. Non-Participants					
Age	7.675	15	24.996	Not Significant	Ho Accepted
Gender	1.694	5	11.070	Not Significant	Ho Accepted
Average Final Grade in Grade 6 Math	63.845	15	24.996	Significant	Ho Rejected
School Type	13.963	5	11.070	Significant	Ho Rejected

Data showing a relationship between the average final math grades of Grade 6 MTAP participants and their confidence levels points to the critical importance of self-assurance in academic achievement. A more optimistic outlook, which influences how students approach learning and problem-solving, may be indicated by higher Confidence.

Teachers may use this knowledge to implement tactics like focused feedback and group projects that develop and boost students' self-esteem. Acknowledging the relationship between self-belief and academic performance in the context of MTAP highlights the need to develop students' emotional resilience and quantitative ability. This information supports using holistic teaching strategies that consider the emotive and cognitive components of learning.

Also, the table shows that the non-MTAP participants' mathematics performance in MTAP has significant relationships with their average final grade in Grade 6 mathematics and their school type. The computed Chi-square values of 63.845 and 13.963 are significantly higher than their critical values of 24.996 and 11.070, respectively.

The data imply that non-MTAP participants' mathematics performance in MTAP correlates with their average final grade in Grade 6 mathematics and school type. According to statistics showing a correlation between non-MTAP participants' performance in MTAP and their average final grades in Grade 6 mathematics and the type of school these non-MTAP participants graduated, there may be a connection between participation in math contests and general academic ability. Improved MTAP scores signify a better comprehension of mathematical ideas and more vital problem-solving skills. Teachers may use this knowledge to motivate students to engage in extracurricular activities to improve their mathematical skills.

In their 2017 study, Quarles and Davis investigated the connection between developmental arithmetic procedural and conceptual learning and degree-progress indicators like grades. After adjusting for prior class grades, procedural algebraic skills were not linked to higher math grades. Procedural but not conceptual abilities were considerably poorer in students who skipped math classes for at least one semester. The results cast doubt on the community college research's premise that better student outcomes will result from more students learning remedial mathematics. The findings imply that student outcomes may be impacted by the kind of mathematics taught in developmental programs (Capuyan et al., 2019).

Table 11 presents the test results of the significance of the relationships between the MTAP and non-MTAP participants' mathematics performance in Algebra and their profiles.

Table 11
Relationship between Profile of the Respondents and the Mathematics Performance in Algebra (alpha = 0.05)

Mathematics Performance in Algebra	Chi-Square	df	Critical Value	Significance	Result
I. Participants					
Age	10.696	8	15.507	Not Significant	Ho Accepted
Gender	1.283	4	9.488	Not Significant	Ho Accepted
Average Final Grade in Grade 6 Math	56.445	12	21.026	Significant	Ho Rejected
School Type	3.301	4	9.488	Not Significant	Ho Accepted
II. Non-Participants					
Age	13.014	12	21.026	Not Significant	Ho Accepted
Gender	2.199	4	9.488	Not Significant	Ho Accepted
Average Final Grade in Grade 6 Math	47.364	12	21.026	Not Significant	Ho Accepted
School Type	17.055	4	9.488	Significant	Ho Rejected

The table shows that the MTAP participants' mathematics performance in MTAP has a significant relationship with their average final grade in Grade 6 mathematics. The computed Chi-square value of 24.466 is significantly higher than its critical value of 21.026 at a df 12.

The data imply that MTAP participants' mathematics performance in Algebra correlates with their average final grade in Grade 6 mathematics. This finding demonstrates a relationship between the average final math grades of Grade 6 participants in the MTAP program and their Algebra performance, underscoring the predictive significance of specific mathematical abilities. Algebra proficiency may be a significant sign of general mathematical ability as it indicates a basic comprehension of basic ideas. Teachers may utilize this understanding to customize lessons and interventions, emphasizing the development of algebraic skills to improve students' overall performance.

Also, the table shows that the non-MTAP participants' mathematics performance in Algebra has a significant relationship with the school type. The computed Chi-square value of 17.055 is significantly higher than its critical value of 9.488 at a df of 4.

The data imply that non-MTAP participants' mathematics performance in Algebra correlates with the school type. It shows a significant relationship between the kind of school attended and non-MTAP participants' algebraic performance. Results point to the influence of school type on algebraic competency. This finding inspires more research into various school models' resources and teaching strategies. Comprehending these associations enables teachers to tailor interventions and enhancements in the teaching of algebra, allowing them to modify approaches according to the distinct features of every educational environment and augment the arithmetic proficiency of non-MTAP participants.

5. Conclusion

The study concluded that the attitudes of junior high school students who participated in the MTAP-DepEd Math Challenge positively impacted their academic performance in mathematics. It is also revealed that the average final grades in mathematics during their elementary years are correlated with their MTAP-DepEd Math Challenge participants' attitudes toward mathematics and their performance in algebra. This study is bounded only to one DepEd Schools Division out of 223 Schools Division Offices in the Philippines; thus, the researchers recommend conducting similar studies in the other DepEd Schools Division to strengthen these preliminary findings.

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