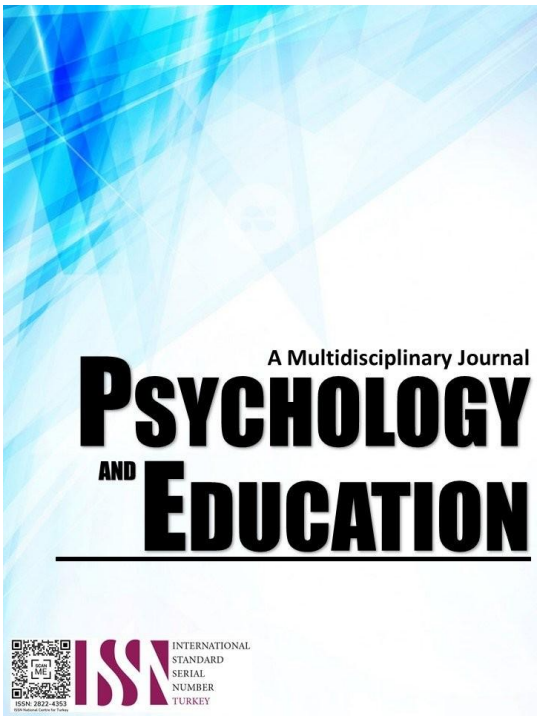
QUANTITATIVE ANALYSIS ON LEARNERS' CHALLENGES TOWARDS NUMERACY LITERACY AND ITS PREDICTORS



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Research Article

Quantitative Analysis on Learners' Challenges Towards Numeracy Literacy And Its Predictors

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Abstract

The study examined the relationship between learners' profiles and their academic performance. The descriptive-correlational research method was utilized, and the Statistical tools used in the study were mean, standard deviation, frequency, and percentages to determine the learners' attitude towards the mathematics subject and learners' academic performance, respectively. Pearson's r was used to assess the relationship between learners' profiles and academic performance. Findings revealed that gender differences significantly influenced learners' academic performance. It was also found that learners' attitude towards the mathematics subject and socio-economic status do not influence learners' academic performance. In summary, it was recommended that school principals or school heads encourage teachers to provide more engaging learning activities to strengthen learners' attitudes towards math. Parents are also inspired to provide essential support for mathematics learning at home, and teachers are to provide a more engaging mathematics classroom.

Keywords: *Attitude towards math, gender differences, socio-economic status, Academic performance*

Introduction

Achieving excellence in Mathematics teaching is the first step towards professionalizing Mathematics teachers. To do this, Mathematics teachers should aim to pursue a high-quality education. Through their course offerings, practicum or field experience, and support structures, teacher education institutions (TEIs) must, for their part, offer excellent education to future Mathematics teachers and not settle for anything less.

The many challenges that Mathematics teachers and educators face today make Mathematics teaching especially difficult. Foremost, among these challenges is the amount and depth of Mathematics content that teachers ought to master. Mathematics teachers need to display encouraging behaviours and attitudes and engage in lifelong professional development.

A teacher's quality, supported by training and experience, has an influential role in effective teaching and learning. Teaching experience plays an important role in the success of education (Dinglasan,2019).

Mastery of Mathematics is a key literacy component that influences children's success in education and in future society (Engle, 2019). As cited by Patena and Dinglasan in the study of Cabatay et al. (2019), mathematics is learned for many reasons. Firstly, mastery of basic mathematical skills is needed to cope with the demands of life. Such demands include being numerically literate, gaining skills for future employment, developing the prerequisites for further education, and appreciating the relationship between mathematics and technology. Secondly, Mathematics is the language of the Sciences, and many disciplines depend on this subject as a symbolic means of communication. Thirdly, Mathematics education can play an important part in developing pupils' general decision-making and problem-solving skills.

Teaching Mathematics, especially for Grade 4, 5, and 6 pupils, has been presented with new emphasis and trends. The program's emphasis has been on understanding the concepts rather than memorizing what is presented in each lesson or topic. The quality of learning a pupil acquires in the classroom depends largely on the quality of the teacher's performance. Teachers are the most influential individuals in instilling knowledge and developing learners' behavior.

According to Fuentes (2019), "advise the teacher educator-user to make good use of the varied learning activities given at the end of each lesson". These activities allow every learner to interact with the learning materials and with other learners in the classroom. The pupils will have a better attitude if they view the classroom and the subject positively. Pupils who are engaged in the learning process tend to learn more and be receptive to further learning (Balbalosa, 2020).

Based on the foregoing rationale, the researcher is prompted to conduct this study to determine whether pupils' attitudes towards mathematics, gender, and socio-economic status affect their academic performance in mathematics.

Research Questions

This study aimed to determine the numeracy literacy among Grade 4, 5, and 6 pupils in Minpakiki Integrated School, Division of Gingoog City, for the school year 2023- 2024. Specifically, it sought to answer the following questions:

1. How does the learners characterize in terms of:
    1.1. attitude towards mathematics subject;
    1.2. gender differences; and
    1.3. socio-economic status?
2. What is the numeracy literacy among learners when categorized as:

1.1. Outstanding;
1.2. very satisfactory;
1.3. satisfactory;
1.4. fairly satisfactory; and
1.5. did not meet expectations?

3. Is there an association between respondents' academic performance in Mathematics and their profile in terms of:

Literature Review

People have been dealing with Mathematics ever since the world began. The Greeks used Mathematics to record the outflow of the Nile River, which led them to invent the calendar. For so long, Mathematics has been the key to better advancements in Science and technology. It has led to many discoveries among more technologically inclined individuals and society. Now and then, new inventions are popping up everywhere, including a thorough Mathematical understanding.

Research indicates that fundamental knowledge of Mathematics begins in the early years of development. Most people today still believe that mathematics is all about computation. For mathematicians, computation is just a tool for comprehending the structures, relationships, and patterns of mathematical concepts, and therefore for solving real-life problems. Numeracy impacts individuals across their lifespan, from childhood to adulthood, and has implications for their education and lifelong learning. Pupils' performance in Mathematics is closely associated with the scientific and technological innovations worldwide.

Pupils' level of interest in Mathematics was rated based on their self-perceived level of preparation for the subject, the attention they paid to the teacher's lectures, active class participation, their desire to get good grades, and their desire to listen to discussions or attend class. The students share their unified perception of their level of interest in Mathematics. The item "I want to get good grades in tests, quizzes, assignments, and projects." Ranked first with the average weighted mean (Balbalosa, 2018).

Achieving excellence in Mathematics teaching is the first step towards professionalizing Mathematics teachers. To do this, Mathematics teachers should aim to pursue a high-quality education. Through their course offerings, practicum or field experience, and support structures, teacher education institutions (TEIs) must, for their part, offer excellent education to future Mathematics teachers and not settle for anything less.

According to Corpuz (2017), "advise the teacher educator-user to make good use of the varied learning activities given at the end of each lesson". These activities allow every learner to interact with the learning materials and to other learners in classroom. The pupils will have a better attitude if they view the classroom and the subject positively. Pupils who are engaged in the learning process will tend to learn more and be receptive to further learning. Mother tongue is significant to the precise formulation of mathematical concepts, as all ideas are communicated between the teacher and the learner, either through oral or written material. Emphasizing the importance and relevance of language in Mathematics teaching, Orton (2018) further indicates that Language is important not only for communication but also for facilitating thinking. The language used for thinking is most likely the first language; thus, Mathematics communicated in one language might need to be translated into another to allow thinking, and would need to be translated back in order to converse with the teacher.

Further, Various demographic factors are known to be related to numeracy achievement. Gender issue in numeracy achievement: females tend to do better in computation and earn better grades than males in Mathematics.

Socioeconomic status is also a predictor of mathematics achievement. Ma and Klinger (2019) also reported that socio-economic factors were highly significant for primary math and science achievement scores. Parents with higher economic status tend to be more involved than those with lower economic status.

Meanwhile, the most significant factor affecting the pupils' attitude toward mathematics was the teacher's clarity of presenting the material, as cited by Fuentes on Timbal (2020) Good results in teaching Mathematics can only be obtained if the teacher understands the pupils mentally, emotionally, physically, and socially". The teacher facilitates a child's learning and is responsible for transferring knowledge. An experienced Mathematics teacher recognizes their role in shaping the country's growth and development.

Hannula (2019) examined attitude in cognitive-emotional terms. In his research, he states, "While a student is engaged in a mathematical activity, there is a continuous unconscious evaluation of the situation with respect to personal goals." According to Dowker et al. (2018), Mathematics depends not only on cognitive abilities but also on emotional factors and attitudes. Several studies have shown that emotional factors may play a large part in mathematical performance.

Most studies of attitudes to Mathematics have involved older children and adults. It is imperative to investigate the early development of attitudes to mathematics if we are to understand the relationships between these and actual performance, and if possible, to prevent the development of strongly negative attitudes.

According to Fuentes (2019), most researchers conducted studies in order to know the cause of the pupil's inability to solve problems, to find ways and means, and to overcome the causes, offer techniques, and discover other skills needed to increase pupils' proficiency in Mathematics. Fuentes (2013) added that pupils should not be allowed to get the idea that solving Mathematics is simply a matter of

thrashing around aimlessly until one happens to find solutions.

Fuentes (2019) found that various factors in the home and at school have influenced children's attitudes towards schoolwork. Thus, affecting their study habits, as revealed by a study among Grade Two Pupils.

Factors that can affect performance in Mathematics include study techniques, the characteristics of teachers and school heads, and attitudes towards Mathematics. A proposed plan of action was formulated to improve students' performance in Mathematics (Dinglasan, 2018).

Reynolds (2018) examined how achievement and attitude are related, and what determines students' attitudes. In their study, they found that home environment plays a "pervasive role" in the learning of middle schoolers. Regarding mathematical attitude, they concluded that motivation is a more decisive factor than the home environment. When they looked at the instructional environment, the most significant factor affecting the. Students' attitude toward Mathematics was affected by the teacher's clarity in presenting the material. The students will have a better attitude if they view the classroom and the subject positively.

Henceforth, teachers play an important role in achieving the high standards increasingly emphasized in schools and school systems worldwide. The profession of teaching is becoming increasingly complex, and the demands placed upon teachers are increasing as the world changes.

Methodology

Research Design

This study used the descriptive research method. It is used to determine the relationship between pupils' Mathematics academic performance and the demographic profile. It investigated the pupils' academic performance using their final Mathematics grade for the 2023-2024 school year.

Respondents

The respondents in the study are the Grade 4, 5, and 6 learners of Minpakiki Integrated School, Division of Gingoog City. The respondents are chosen purposively for the researcher's convenience and accessibility. Hence, according to Mizner (2208), the purposive-convenience sampling procedure is a non-probability sampling technique in which subjects are selected because of their convenient accessibility and proximity to the researcher.

Instrument

The researcher adopted the research instrument of Andaya (2014), who stressed that Math teachers should use effective instruction that motivates pupils and enables them to perform better in the Mathematics subject.

The researcher chose questions that suited the pupils' needs, understanding, and feelings. The first instrument consists of ten (10) questions for Pupils' Attitude Towards Mathematics, which include five scales: Strongly Agree, Agree, Disagree, Strongly Disagree; and categories for Gender Differences, and Socio-Economic Status.

The second instrument is to determine the teachers' work performance based on the teachers' individual performance commitment form (IPCRF), for the school year 2023-2024, the yearly academic evaluation of teachers.

Procedure

Before data collection, a letter requesting permission to conduct the study was secured from the office of the Dean of the Graduate School, then from the Schools Division Superintendent and the school principal.

Upon permission being granted, the researcher immediately administered the questionnaire with the school principal's permission. Each item in the category ranges from 4 (Strongly Agree) to 1 (Strongly Disagree).

Upon the approval, the researcher explained the purpose of the study. She assures the respondents that their anonymity will be strictly maintained. With the school principal's help, the researcher administered the questionnaire and waited 30 minutes to collect it. The questionnaires were collected, and the data obtained were tabulated in tables.

Categorization of Variables

Table 1. *Attitude Towards Mathematics*

Score	*Range*	*Qualitative description*
4	3.25 – 4.00	Strongly Agree
3	2.50 – 3.24	Agree
2	1.75 – 2.49	Disagree
1	1.00 – 1.74	Strongly Disagree

Table 2. *Respondent's Gender*

Sex	Score
Male	1
Female	2

Table 3. *Socio-Economic Status*

15,000 & above	5
10,000-14,999	4
6,000- 9,999	3
4,001- 5,999	2
4000 & below	1

Table 4. *Academic Performance*

Quantitative Description	*Qualitative Description*	*Score*
90% and above	Outstanding	5
85-89%	Very Satisfactory	4
80-84%	Satisfactory	3
75-79%	Fairly Satisfactory	2
74% and below	Did not Meet Expectation	1

Data Analysis

Descriptive statistics, including mean and standard deviation, frequency, and percentage, were used to analyze the data for problem 1. For Problem 2, frequency and percentage were utilized to identify the teachers' teaching performance. For Problem 3, to determine the association between the academic performance and the demographic profile, Pearson Product-Moment Correlation was used to analyze the data.

Results and Discussion

This section presents, analyzes, and interprets the findings from the quantitative analysis of learners' challenges in numeracy and literacy, along with their profile. Data analysis and interpretation are carried out based on the problem presented.

How do the learners characterize in terms of attitude towards the mathematics subject, gender differences, and socio-economic status?

Learners' attitudes towards math, gender, and family's social or socio-economic standing are said to influence their school and learning performance, especially in developing numeracy and literacy competencies.

Laney et al. (2021) averred that a positive attitude towards mathematics and a family's socio-economic standing can lead to higher achievement in mathematics, which in turn can result in more favourable attitudes. Learners' attitude towards the learning area can affect their overall achievement. Additionally, peer groups within their gender group, which promote self-esteem, self-confidence, enjoyment, motivation, and math anxiety, are reflected in their positive attitude towards the subject.

Table 5 presents the mean distribution of learners' attitudes towards the Mathematics subject.

Table 5.*Mean Distribution of Learners' Attitude towards the Mathematics Subject*

Indicators	*Mean*	*SD*	*Verbal Description*
I am sure that I learn can Mathematics.	3.75	.435	Strongly Agree
Knowing Mathematics will help me earn a living.	3.52	.509	Strongly Agree
I will need Mathematics subject for my future.	3.24	.522	Agree
I am sure of myself when I do mathematics.	3.04	.454	Agree
Mathematics is a worthwhile and necessary subject.	2.96	.351	Agree
I know I can do well in the Mathematics subject.	2.76	.435	Agree
I can get good grades in the Mathematics subject.	2.64	.568	Agree
Overall Mean	3.13	.468	Agree

Legend: 3.25-4.00 Strongly Agree/2.50-3.24 Agree/1.75-2.49 Disagree/1.00-1.74 Strongly Disagree.

Table 5 presents the mean distribution of learners' attitudes towards the mathematics subject. Overall, learners agreed that they have a positive attitude towards mathematics, as evidenced by a mean of 3.13 (SD = .468). The result indicates that learners had a positive attitude towards learning mathematics.

The indicator that states, "I am sure that I can learn Mathematics". Obtained the highest mean of 4.91 (SD=.435), which is verbally described as "Strongly Agree". This indicates that learners are confident they will learn in their Mathematics subject.

Samson et al. (2022) reported that learners' attitudes towards Mathematics are pervasive and are associated with higher mathematical performance. Based on the findings, learners' attitude towards Mathematics is manifested in their positive beliefs that they can learn more in Mathematics.

On the contrary, the lowest mean of 2.64 (SD = .568) verbally described as "Agree", which states that "I can get good grades in the Mathematics subject". This implies that learners had a positive attitude toward getting good grades in Mathematics.

This finding was supported by Samson et al. (2022), who suggest that learners' attitude towards the subject helps them stimulate learning engagements and performance.

Table 6 presents the mean distribution of learners' gender differences towards Mathematics.

Table 6. *Frequency Distribution in terms of Gender Differences*

Gender	*Frequency*	*Percentage*	
Male		12	48%
Female	13	52%	
Total		25	100%

Table 6 presents the frequency distribution by gender. The table shows that the majority of the learner-respondents were female (13 out of 25, 52%), while only 12 (48%) were male respondents out of the 25 total population sample.

Table 7. *Learners' Socioeconomic Status*

Socio-Economic Status (Monthly Income in Pesos)	*Frequency*	*Percentage*
P15,000 and above	0	0%
P10, 000 – P14, 999	0	0%
P 6, 000 – P 9, 999	0	0%
P 4, 001 – P 5, 999	5	20%
P 4, 000 and below	20	80%
Total	25	100%

Table 7 presents the frequency distribution of learners' socio-economic status. It was reported that 20 out of 25 respondents indicated that their parents' monthly income was P 4,000 or less, and 5 out of 25 respondents indicated that their parents' monthly income ranged from P 4,001 to P 5,999.00. These findings indicate that the parents of the learner-respondents had a monthly income below the poverty per capita threshold of P 13,873.00 (based on the Philippine Statistics Authority's 2024 survey for at least five family members). This indicates that the parents of the learner-respondents earned below the monthly per capita income, which suggests that learners were not provided with basic nutritional foods and other necessities.

Osman et al. (2024) averred that socio-economic status directly affects academic achievement due to a lack of resources available to learners to succeed. Low achievement is closely correlated with limited resources, and numerous studies have documented the link between low socio-economic status and low achievement.

What is the numeracy and literacy performance of learners when categorized as outstanding, very satisfactory, satisfactory, reasonably satisfactory, and did not meet expectations?

Table 8. *Frequency Distribution of Learners' Numeracy and Literacy Performance*

Performance	*Frequency*	*Percentage*
Outstanding	1	4%
Very Satisfactory	6	24%
Satisfactory	16	64%
Fairly Satisfactory	2	8%
Did not meet expectations	0	0%
Total	25	100%

Table 8 presents the frequency distribution of learners' numeracy and literacy performance. The table shows that 16 out of 25 respondents, or 64%, had satisfactory performance, and 6 out of 25 learner-respondents, or 24%, had very satisfactory performance. In contrast, an insignificant 8% performed their academic and school activities impartially.

Osman et al. (2024) avowed that overall academic performance is influenced by learners' attitude towards the learning areas and the family's socio-economic standing. Additionally, it was highlighted that academic performance across different forms of assessment is influenced by many factors, such as learners' attitudes and learning readiness, social environment, and family support.

Is there a significant relationship between respondents' academic performance in Mathematics and their profile in terms of attitude towards mathematics support, gender differences, and socio-economic status?

Table 9 displays the results of the test of the significant relationship between the learners' academic performance and learners' profile in terms of attitude towards the Mathematics subject, gender differences, and socio-economic status.

Results revealed that learners' attitude towards Mathematics shows negligible correlation with learners' academic performance, as evidenced by the r value of .013, which is lower than the P-value of .950. Thus, the null hypothesis was accepted.

Table 9. *Significant Relationship between Learners' Academic Performance and Learners' Profile*

	Learners' Academic Performance			
Learners' Profile	*r*	*P-Value*	*Interpretation*	*Decision on Ho1*
Attitude towards Math	.013	.950	Denotes negligible correlation	Accepted
Gender Differences	.272	.265	Indicates low or Slight Relationship	Rejected
Socio-Economic Status	.123	.558	Denotes Negligible Correlation	Accepted

**significant at p<0.05 alpha level*

Additionally, gender differences indicate a low or slight relationship to learners' academic performance as evidenced by the r value of .272, which is higher than the P-value of .097. Thus, the null hypothesis was rejected.

Further, Socio-Economic Status shows a negligible correlation with learners' academic performance, as evidenced by the r value of .123, which is lower than the P-value of .558. Thus, the null hypothesis was accepted.

Based on the findings, it can be inferred that attitude towards the Mathematics subject and socio-economic status do not influence learners' academic performance. However, gender differences affect or influence learners' academic performance.

These findings are in contrast with Oman et al (2024), who argued that overall academic performance is influenced by learners' attitude towards the learning areas and family's socio-economic standing. Additionally, it was highlighted that academic performance across different forms of assessment is influenced by many factors, including learners' attitudes and learning readiness, social environment, and family support.

Conclusions

Based on the study's findings, it can be concluded that learners' attitudes toward mathematics significantly influence their engagement and overall performance in the subject. A positive learning attitude tends to enhance participation and achievement; however, this effect is not always consistent. In some cases, learners who express a favorable attitude still fail to perform well on assessments and evaluations due to factors such as anxiety, low confidence, or difficulty translating understanding into measurable outputs.

The study also revealed that gender differences exert a notable influence on learners' academic performance in mathematics. Findings generally indicate that female learners tend to be more engaged, attentive, and academically focused compared to their male counterparts. These behavioral tendencies may contribute to their comparatively stronger performance, although individual differences must also be acknowledged.

Furthermore, socio-economic status was found to affect learners' academic performance, particularly when parents are unable to provide adequate financial or material support needed for successful learning. Limited access to resources can hinder study habits and participation. Nevertheless, other studies emphasize that economic disadvantage does not solely determine learning success. Many learners with limited resources continue to excel despite these constraints, thanks to strong cognitive abilities, intrinsic motivation, resilience, and supportive learning environments.

In light of these findings and conclusions, several recommendations are proposed. School principals or school heads are encouraged to consistently motivate teachers to design meaningful learning experiences that make mathematics more engaging and fulfilling. Parents, as essential stakeholders, should likewise be encouraged to provide learning support at home to nurture their children's interest in mathematics. Teachers are also urged to continue developing creative, relevant, and thought-provoking classroom activities that strengthen learners' engagement, confidence, and sense of ownership in the learning process.

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