The Use of Flipped Classroom Approach in Teaching Mathematics in Parang National High School – Main Campus

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ABSTRACT. This research explored the adoption of the flipped classroom approach within the junior secondary level learners at Parang Senior Secondary School – Main Campus, located in Parang, Sulu. The study adopted a descriptive-correlational research design, which, as noted by Gay (1976), entails collecting information to test proposed hypotheses and explore issues related to the current condition of a specific topic. This method was selected as it best suited the study's aim of examining relationships and answering key research questions. A total of 100 students were intentionally chosen through purposive sampling. Findings revealed that the majority of participants were 13–14 years old, primarily female, and came from households where parents had completed only secondary education. Overall, students viewed the flipped classroom as helpful for learning mathematical concepts, engaging with video content, and fostering independent study skills. While some preferred traditional instruction, most responded positively to the flipped model. Notably, age and grade level influenced student participation in flipped learning, while gender and parental education did not. The study also found strong correlations between understanding new concepts, video-based learning, and self-guided study, underlining the importance of structured content and classroom support in this instructional model.

KEYWORDS: Use, Flipped, Classroom Approach, Mathematics

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Introduction

Mathematics holds a crucial position within the academic framework of Nigeria, according to the 2013 edition of Nigeria's National Policy on Education (Federal Republic of Nigeria), making it a compulsory subject up to tertiary education. Its central role from primary through secondary school levels reflects its significance in shaping analytical and problem-solving abilities vital to societal advancement. Despite this, students' consistent underperformance in both internal and external mathematics examinations remains a major concern (Maruta et al., 2022).

Researchers in mathematics education have pinpointed a variety of causes for this persistent struggle. Contributing factors include weak foundational knowledge, overcrowded classrooms, outdated instructional materials, widespread math anxiety, and ineffective teaching strategies. Other issues involve inadequate resources for instruction, negative attitudes from both students and teachers, lack of student engagement, and poor knowledge retention (Mogege & Egara, 2022; Nzeadibe et al., 2019; Okeke et al., 2023; Egara et al., 2021; Nzeadibe et al., 2020; Osakwe et al., 2023).

The flipped classroom approach has gained recognition as a viable substitute for conventional instruction. in recent years. While numerous studies both domestic and international have explored its effects on student academic achievement, findings have been inconclusive (Qing Zhang, Cheung & Cheung). Unlike traditional models, where teachers dominate classroom time and students passively absorb content, the flipped classroom redefines roles. It encourages learners to study instructional learning materials beyond the classroom setting, enabling teachers to act as facilitators during class time and focus on higher-order thinking activities.

Originating in the U.S. during the late 1990s and gaining traction during the early 2000s, the flipped classroom model was first conceptualized by scholars like Lage, Platt, and Treglia (2000), who introduced it in an introductory economics class at the University of Miami in order to support varied learning styles. That same year, Baker (2000) published work promoting flipped instruction through web-based tools. Around the same time, the University of Wisconsin-Madison integrated streaming video via eTeach for computer science instruction (Zhang et al.).

Empirical studies suggest that this approach may lead to better academic outcomes. For instance, Thai et al. (2017) at Ghent University found that learners in a flipped classroom scored significantly higher in an "invertebrate science" course compared to their peers in traditional settings. In contrast, students from educational systems influenced by traditional pedagogy, such as in China, often struggle with self-directed learning and tend to rely heavily on teacher guidance, showing limited initiative (Liu et al., 2017).

With the growing popularity of innovative teaching strategies, educators are increasingly embracing methods like the flipped classroom. These models merge technology, creativity, and strategic planning to engage students more effectively marking a significant departure from conventional lecture-based instruction (Zhang et al.).

Research Questions

This research examined the application of the flipped classroom model among junior high school students at Parang National High School - Main Campus. Therefore, the study sought to answer the following questions.

1. What is the demographic profile of junior high school students of Parang National High School - Main Campus in terms of;
   1.1 Age;
   1.2 Gender;
   1.3 Grade level; and
   1.4 Parent's Educational attainment?
2. What is the extent of the use of flipped classroom approach among junior high school students of Parang National High School - Main Campus in the context of;
   2.1 Learning new Mathematics concepts;
   2.2 Learning through video lessons; and
   2.3 Learning independently?
3. Is there a significant difference in the extent of the use of flipped classroom approach among junior high school students of Parang National High School - Main Campus where they are grouped according to;
   3.1 Age;
   3.2 Gender;
   3.3 Grade level; and

3.4 Parent's Educational attainment?

4. Is there a significant correlation among the sub-categories subsumed on the extent of use of flipped classroom approach among junior high school students at Parang National High School – Main?

Foreign Literature and Studies

Definition and evolution of the flipped classroom. This approach to flipped learning, or inverted classroom, first introduced in the United States in the late 20th century and gained popularity in the early 2000s. Lage, Platt, and Treglia (2000) introduced it to support diverse learning styles in higher education, while Baker (2000) further developed the concept using digital tools that repositioned teachers as facilitators of learning.

Benefits of the Flipped Classroom Approach. This model offers learners flexibility, enabling them to learn at their own speed and build skills like self-discipline and autonomy (He et al., 2016; Yang, 2017). Lessons are broken into manageable video segments, which students can access anytime (Forsey et al., 2013; Jensen, 2011), supporting individualized learning experiences.

Demographic Factors and Learning Outcomes. While gender is traditionally considered a variable in educational achievement (Authors, 2023), studies show it has minimal influence in flipped classrooms. Ikwuka and Okoye (2022) found no significant gender-based performance differences, although Chebotib et al. (2022) noted that female students in Kenya performed better in science subjects using this approach. Students' socioeconomic background, as noted by Montgomery (2015), also plays a role in shaping educational access and support, often linked to parental education.

Flipped Classroom and Learning Mathematics Concepts. Flipped instruction supports deeper understanding of new topics by shifting direct instruction beyond the classroom and utilizing class time for applied learning. Kuiper et al. (2015) stress that meaningful classroom activities enhance conceptual learning. Collaborative, student-centered strategies are integral to this model (Butt, 2014; Findlay-Thompson & Mombourquette, 2014; Strayer, 2012). Wington (2013) found that students, prepared through video content, engaged more in algebra lessons.

Learning Through Video Lessons. Engagement through video instruction has been linked to improved academic outcomes and reduced attrition rates (Fredricks et al., 2004); Abín et al., 2020). Flipped classrooms use pre-recorded materials to replace lectures, freeing class time for discussion and interaction (Lo et al., 2017; Yang et al., 2019). Bond (2020) reported that students enjoy learning via video and feel less anxious when they can rewatch lessons. Zhong et al. (2013) and Bergmann & Sams (2012) emphasized how students prepare before class using videos, which enhances active participation during class.

Promoting Independent Learning. Flipped instruction encourages learners to take control of their studies. Hamdan et al. (2013) and Bishop & Verleger (2013) highlight how students use digital content independently before class and engage in problem-solving during sessions. Li et al. (2018) and Liu et al. (2017) found increased student autonomy and participation in flipped settings. Similar outcomes were reported by Coufal (2014), Schmidt (2013), and Wiginton (2013), who noted improved motivation and self-directed learning in math classrooms.

Supporting Research on Flipped Classroom Effectiveness. A range of studies confirms the effectiveness of this approach. Uy (2022), Harmini et al. (2022), and Wei et al. (2020) showed that students in flipped classrooms outperformed those in traditional settings. Gender

had no major impact on achievement in studies by Makinde & Yusuf (2017) and Kutigi et al. (2022). Strayer (2012) and Fulton (2012) noted the flipped classroom's ability to replace in-class lectures with video content, allowing more time for student-centered activities. Videos also let students control their learning pace (Goodwin & Miller, 2013; Brecht & Ogilby, 2008).

Flipped Classroom as a Tool for Modern Math Education. Recent research emphasizes the flipped classroom's role in digital transformation of math education. Cevikbas & Kaiser (2020, 2022) describe it as a blended model that improves mathematical reasoning and student-centered problem-solving. When paired with collaborative classroom strategies, the model enhances critical thinking, motivation, and academic performance (Shaikh, 2022; Voigt et al., 2020; Nugraheni et al., 2022; Lo & Hew, 2017).

Local Literature and Studies

Effectiveness of the flipped learning approach. This model of flipped learning is increasingly recognized in the Philippine educational context as a strategy that boosts student performance and engagement. Hwang, Lai, and Wang (2015) found that flipped learning outperforms traditional models by fostering more engaging and learner-focused environments. Similarly, Chavez and Lamorinas (2023) highlight the impact of the flipped classroom model in enhancing academic achievement, particularly during the shift to online education as a result of the COVID-19 pandemic the interactive nature of flipped learning has been shown to create more dynamic and engaging classroom environments, which is consistent with the results of Hwang et al. (2015) on the benefits of active learning.

Implementation in Philippine Schools. Gonzales (2020), conducting research at Angels of Myriad Academy of Antipolo, tested the effectiveness of a Virtual Flipped Classroom involving Junior High students aged 12–15. The method included pre-recorded video content in Mathematics, Science, and Physical Education. The study revealed that students not only improved academically but also became more confident and independent learners. This finding is supported by the work of Chavez (2020), which discusses how flipped learning encourages student autonomy by providing opportunities for independent learning. Flipped classrooms allow students to interact with content at their own speed prior to class, which facilitates a more tailored learning experience.

Student Autonomy and Learning Flexibility. Supriasih, Fathurohman, and Sriyanti (2023) emphasized how the flipped approach empowers students to control their learning schedules, increasing comprehension. This flexibility is especially valuable in low-resource environments where home study supports learning continuity. This aligns with Chavez and Lamorinas (2023), who noted that the flipped classroom provides chances for independent learning, giving students more flexibility in managing their academic responsibilities. Additionally, Murro et al. (2023) found that flipped learning helps students feel more engaged in the learning process by offering them control over the pace at which they acquire knowledge.

Improvement in Study Habits and Motivation. According to Llona (2020) of Bicol University, the flipped classroom fostered better study habits and greater academic interest. The model promoted student accountability, initiative, and deeper understanding of content. These behavioral improvements were backed by qualitative data such as interviews and student journals. A similar finding was presented by Chavez et al. (2023), who observed that the flipped classroom improves student motivation and encourages more active participation in learning activities. This model's impact on motivation is consistent with the findings of Chavez (2024),

who suggested that the integration of technology in flipped classrooms helps reduce student anxiety and fosters a positive learning environment.

Support in Mathematics Instruction. At Malay National High School in Aklan, Batilantes (2020) introduced flipped video instruction to supplement traditional mathematics teaching. The flipped model allowed students to learn without the pressure of fast-paced in-class lectures and helped sustain engagement even in the teacher's absence, especially useful when instructors face other school responsibilities. Chavez (2024) further supported this finding, noting that flipped classrooms not only alleviate the pressure on students but also foster greater engagement by giving students time to review lessons at their own pace before coming to class. The flipped model has thus become an effective tool for teaching complex subjects such as mathematics, where students can benefit from more flexible learning structures.

Advantages of Pre-Class Materials and Active In-Class Time. Zhang et al. highlighted that when foundational lessons are completed at home via videos, classroom time can be devoted to problem-solving, discussion, and collaborative learning. This makes learning more active and personalized. Students can revisit difficult concepts through videos and come to class better prepared, enhancing comprehension and participation. In line with this, Chavez (2024) found that students in flipped classrooms are better equipped to engage in active learning, as they arrive in class with a foundational understanding of the material. This allows for more in-depth discussions and collaborative activities during class time, which ultimately leads to better retention and comprehension.

Local Research Supporting the Flipped Classroom Model. Local research supports the global consensus that flipped classrooms not only increase academic success but also foster autonomy, critical thinking, and motivation. When implemented effectively with appropriate materials and support, this model has the potential to significantly transform classroom dynamics and student outcomes across Philippine schools. In addition, Murro et al. (2023) observed that parental involvement has a major impact on supporting the flipped classroom model, especially in the context of distance learning during the pandemic. Parents' involvement in creating a supportive learning atmosphere at home positively impacts students' academic performance and engagement. Similarly, Inoferio et al. (2024) found that AI-assisted learning can help alleviate learning difficulties such as math anxiety, which is crucial in subjects like mathematics, making the flipped classroom approach even more effective.

Methodology

This chapter outlines the research approach applied in the research, including the location of the research, details on the target population and sample group, a description of the participants, the tools utilized for data collection, the procedures followed to gather the data, and the statistical methods employed for data analysis.

1. Research Design

The research approach used in this study is descriptive-correlational. Gay (1976, p. 69) defines this design as one that gathers data to test hypotheses and explore inquiries regarding the current condition of the subject under investigation. In the context of this study, the descriptive-correlational approach was chosen as it is the most suitable for collecting data to address the research questions and evaluate the associated hypotheses.

2. Research Locale and Respondents

The research was carried out in Parang, Sulu, with a specific focus on Parang National High School – Main Campus.

The participants in this study consisted of 100 students from Parang National High School – Main Campus.

3. *Sampling Design*

This research utilized a purposive sampling technique, where the sample population of students from Parang National High School – Main Campus was intentionally selected.

4. *Research Instrument*

A survey questionnaire in checklist form was utilized in this study, which was adopted and adapted from several sources, including Phanuwat Unakorn (2015), Chung Kwan Lo and Khe Foon Hew (2021), Mustafa Cevikbas, Gabriele Kaiser (2022), Tracey Muir and Helen Chick (2014), Clark (August), Emma R. Durong, Alyanna Joyce D. Rana, Mary Rose Basiliote, Jerald C. Moneva (2018), Syam (2014), Associate Professor Dr. Rozinah Jamaludin and Siti Zuraidah Md Osman (2014), and Nurmawati, Ismartoyo, Eem Kurniasih (2023), as found in Google Scholar.

The questionnaire was divided into two parts. Section I collected data on the respondents' demographic profiles. Section II comprised three thematic areas: Learning New Mathematics Concepts (10 items), Learning Through Video Lessons (10 items), and Learning Independently (10 items). Participants were requested to assess their level of agreement with each statement using a five-point Likert scale (5: Strongly Agree; 4: Agree; 3: Neutral; 2: Disagree; and 1: Strongly Disagree).

5. *Data Gathering Procedure*

The researcher acquired a letter of permission from the Graduate Studies Dean's Office to distribute the survey questionnaire. Upon receiving this approval, the researcher then sought authorization from the President of Sulu State College. After gaining the necessary approval from the college authorities, the researcher presented the endorsed letter to the Officer-in-Charge (OIC) Principal of Parang National High School – Main Campus. This step was taken to notify the Principal of the study and seek permission to proceed with data collection. Once approval was granted, the researcher administered the questionnaires to the selected sample respondents

6. *Statistical Treatment of Data*

The data were analyzed using the following statistical tools:

A. For Problem 1, frequency distribution and percentages were employed.
B. For Problem 2, the mean and standard deviation were utilized.
C. For Problem 3, a t-test was applied to assess gender differences, while Analysis of Variance (ANOVA) was used to examine differences based on other demographic profiles.
D. For Problem 4, Pearson Product-Moment Correlation was used to determine the strength and direction of the correlation.

Results

This chapter provides a comprehensive assessment and explanation of the study's results based on the data collected. It delves into the implementation of the flipped learning model among secondary school student at Parang National High School - Main Campus. Additionally, the

chapter looks into the demographic features of the student participants, such as their age, gender, grade level, and the educational backgrounds of their parents. The discussion also covers the extent to which the flipped classroom approach is applied in the areas of Learning New Mathematics Concepts, Learning Through Video Lessons, and Learning Independently. Furthermore, it assesses any significant correlations and differences within these areas when categorized according to the students' demographic profiles. The findings are presented, analyzed, and interpreted based on the accurate scoring and statistical techniques applied to address each research question in the study.

1. What is the demographic profile of junior high school students at Parang National High School - Main Campus in terms of: 1.1 Age, 1.2 Gender, 1.3 Grade Level, and 1.4 Parents' Educational Attainment?

1.1 In terms of Age

Table 1.1 the demographic characteristics of the middle school students at Parang National High School - Main Campus, based on age, reveals the following data: Out of 100 respondents, 5 students (5%) are 12 years old or younger, 57 students (57%) are aged between 13 and 14 years old, 32 students (32%) fall within the 15 to 16-year-old range, and 6 students (6%) are 17 years old or older. The most respondents are from the 13–14 age group, comprising over half of the sample population. A significant portion, nearly one-third, consists of students in the 15–16 age range. Meanwhile, a smaller proportion is made up of students aged 12 years and below or 17 years and above. These findings suggest that most secondary school students at Parang National High School - Main Campus are within the typical age range for their educational level.

Table 1.1 Demographic Profile of Junior High School Students of Parang National High School - Main Campus by Age.

Age	Number of respondents	Percent
12 years old and below	5	5%
13-14 years old	57	57%
15-16 years old	32	32%
17 years old and above	6	6%
Total	100	100%

1.2 In terms of Gender

Table 1.2 the demographic profile of junior high school students at Parang National High School - Main Campus, based on gender, reveals that out of 100 respondents, 22 (22%) are male, while 78 (78%) are female. These results show that the majority of respondents are female, comprising more than three-fourths of the total population. In contrast, male respondents make up less than one-fourth of the population. This gender distribution indicates a predominantly female student body at Parang National High School - Main Campus.

Table 1.2 Demographic Profile of Junior High School Students of Parang National High School - Main Campus by Gender.

Gender	Number of respondents	Percent
Male	22	22%
Female	78	78%
Total	100	100%

1.3 In terms of Grade Level

Table 1.3 the demographic profile of junior high school students at Parang National High School - Main Campus, based on grade level, shows an equal distribution of respondents across all grade levels. Out of 100 respondents, 25 students (25%) are from Grade 7, 25 students (25%) are from Grade 8, 25 students (25%) are from Grade 9, and 25 students (25%) are from Grade 10. These findings indicate that the respondents are evenly represented across the four grade levels, suggesting a balanced participation of students from different stages of junior high school education at Parang National High School - Main Campus.

Table 1.3 Demographic Profile of Junior High School Students of Parang National High School - Main Campus by Grade Level.

Grade Level	Number of respondents	Percent
7	25	25%
8	25	25%
9	25	25%
10	25	25%
Total	100	100%

1.4 In terms of Parents' Educational Attainment

Table 1.4 the demographic profile of junior high school students at Parang National High School - Main Campus, based on their parents' educational attainment, reveals that out of 100 respondents, 43 students (43%) have parents who are high school graduates, while 30 students (30%) have parents who completed college education. Additionally, 12 students (12%) have parents who finished elementary education, 13 students (13%) have parents with no formal education, and only 2 students (2%) have parents who attained post-graduate education. These findings suggest that the majority of students come from families where their parents have at most completed high school. A smaller proportion of students have parents with higher education levels, while a significant percentage have parents with limited or no formal education.

Table 1.4 Demographic Profile of Junior High School Students of Parang National High School - Main Campus by Parents' Educational Attainment.

Parent's Educational Attainment	Number of respondents	Percent
No Formal Education	13	13%
Elementary Graduates	12	12%
High School Graduates	43	43%
College Graduates	30	30%
Post-Graduates	2	2%
Total	100	100%

2. What is the extent of the use of flipped classroom approach among junior high school students of Parang National High School - Main Campus in the context of: 2.1 Learning New Mathematics Concepts, 2.2 Learning Through Video Lessons, and 2.3 Learning Independently?

2.1 In the context of Learning New Mathematics Concepts

Table 2.1 this section presents the level of utilization of the flipped classroom approach among secondary school students at Parang National High School - Main Campus in the context of learning new mathematics concepts. The data reveals that the total weighted mean is 4.0780, having a standard deviation of 0.52060, corresponding to an overall rating of "Agree." This indicates that students generally perceive the flipped classroom approach positively, especially in terms of enhancing their understanding of new mathematical concepts.

Among the various statements, the highest-rated is "The flipped classroom allowed more time to complete problem sets (worksheets) in class" (Mean = 4.27, S.D. = 0.750), which suggests that students appreciate the increased opportunity for in-class problem-solving activities that the flipped classroom model provides. Another highly rated statement is "I learned a lot of new mathematics content in this classroom" (Mean = 4.20, S.D. = 0.752), indicating that students recognize the impact of the flipped classroom o facilitating content acquisition and learning.

However, the lowest-rated statement is "The flipped learning encourages me to have creative thinking and evaluation" (Mean = 3.92, S.D. = 0.929), which, while still rated as "Agree," suggests that students feel the flipped classroom may have a less significant impact on promoting creative thinking and evaluation compared to other aspects of their learning experience.

These findings demonstrate that the flipped classroom model proves to be effective in supporting students' learning of new mathematical concepts, particularly by enhancing engagement, problem-solving, and content mastery. This is consistent with the findings of Lo, Hew, and Chen (2017), who argue that flipped learning promotes more active engagement and deeper understanding of mathematical concepts by shifting direct instruction outside the classroom and focusing on application-based learning during class time. Moreover, Bergmann and Sams (2014) affirm that students in flipped classrooms typically feel better prepared and more confident in addressing new material compared to traditional, lecture-based environments. To further improve students' experiences and outcomes, it is recommended to strengthen flipped classroom implementation with structured learning materials and interactive activities.

Table 2.1 Extent of the Use ff Flipped Classroom Approach Among Junior High School Students ff Parang National High School - Main Campus in the Context of Learning New Mathematics Concepts.

	Statements	Mean	S.D	Rating
1	The flipped classroom allowed more time complete problem sets (worksheets) in class.	4.27	.750	Agree
2	When the classroom was flipped, I understood problem sets (worksheets) better.	3.96	.764	Agree
3	In this course, I often felt excited about learning new concepts.	4.05	.744	Agree
4	The challenge of math appeals to me.	4.05	.783	Agree
5	I feel well-prepared for the next level of study in this field.	4.13	.747	Agree
6	I learned a lot of new mathematics content in this classroom.	4.20	.752	Agree
7	The learning activities focused on real life applications and improved my learning.	4.01	.859	Agree
8	I enjoy learning new things in this class.	4.12	.891	Agree
9	The flipped learning encourages me to have creative thinking and evaluation.	3.92	.929	Agree

10	I am satisfied with the content and topics of the learning materials.	4.07	.756	Agree
	Total Weighted Mean	4.0780	.52060	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

2.2 In the context of Learning Through Video Lessons

Table 2.2 this section discusses the degree of application of the flipped classroom approach within junior high school learners at Parang National High School – Main Campus, specifically in the context of learning through video lessons. The analysis reveals that the total weighted mean is 3.9500, having a standard deviation of 0.58990. This corresponds to an overall rating of "Agree," indicating that students generally consider video lessons helpful in supporting their learning experience in mathematics.

Among the various statements evaluated, the highest-rated item is "Learning videos for High School Mathematics Curriculum Courses are useful in lectures" (Mean = 4.28, S.D. = 0.805), demonstrating that students highly value video-based instruction in their mathematics education. Another statement that received a high rating is "The video lectures helped me understand math concepts" (Mean = 4.26, S.D. = 0.691), suggesting that video lessons significantly contribute to students' conceptual understanding. In addition, the statement "When I watched the videos, I took notes" (Mean = 4.21, S.D. = 0.913) shows that students actively engage with video content by taking notes, which likely enhances their retention and comprehension of mathematical topics.

On the other hand, the statement that received the lowest rating is "I was more engaged watching the videos than I was during in-class lectures" (Mean = 3.43, S.D. = 1.121), marked as "Partially Agree." This implies that while video lessons are helpful, some students may still find traditional in-class interactions more engaging. Similarly, the statement "I would rather watch a video lecture than do math problems for homework" (Mean = 3.49, S.D. = 1.078) suggests that students do not necessarily view video lessons as a full replacement for traditional problem-solving tasks.

Overall, these outcomes demonstrate that students appreciate the inclusion of video-based learning within the flipped classroom model, as it enables them to review material at their own pace and enhances their understanding through visual and auditory input. These outcomes align with the findings of Hew and Lo (2018), who emphasized that flipped classrooms incorporating video lessons promote deeper engagement and improved comprehension by allowing students to revisit content and learn more independently.

Table 2.2 Extent of the Use ff Flipped Classroom Approach Among Junior High School Students ff Parang National High School - Main Campus in the Context of Learning Through Video Lessons.

	Statements	Mean	S.D	Rating
1	The video lectures helped me understand math concepts.	4.26	.691	Agree
2	I would rather watch a video lecture than do math problems for homework.	3.49	1.078	Partially Agree
3	I was more engaged watching the videos than was during in-class lectures.	3.43	1.121	Partially Agree
4	I watched the video lectures prior to class.	3.98	.964	Agree
5	I often paused the videos when watching them in order to process the content.	4.11	.909	Agree
6	I rewound some videos or watched them more than once.	3.97	.834	Agree

7	I fast forwarded the videos when watching them.	3.62	1.023	Agree
8	When I watched the videos, I took notes.	4.21	.913	Agree
9	Video learning of the High School Mathematics Curriculum Courses looks interesting from a visual and audio perspective.	4.15	.880	Agree
10	Learning videos for High School Mathematics Curriculum Courses are useful in lectures.	4.28	.805	Agree
	Total Weighted Mean	3.9500	.58990	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

2.3 In the context of Learning Independently

Table 2.3 the present study examines the utilization regarding the use of the flipped classroom approach with junior high school students at Parang National High School – Main Campus, particularly in fostering independent learning. The overall weighted mean obtained was 4.1320 accompanied by a standard deviation of 0.51755, which corresponds to an interpretation of "Agree." This implies that, on the whole, students perceive the flipped classroom strategy as beneficial for developing autonomy in learning mathematics.

Among the evaluated items, the highest average score was recorded in support of the claim: "I make up my own examples to help me understand the important concept I am studying for this class" (Mean = 4.31, S.D. = 0.662). This result indicates that learners frequently take initiative by creating their own examples, demonstrating a proactive approach to deepening their understanding of mathematical topics. Another statement that received a high rating was: "When I study for this class, I try to connect what I am learning with my own experiences" (Mean = 4.29, S.D. = 0.743), showing that many students relate academic content to personal experiences, which likely enhances their comprehension and memory retention.

Additionally, the statement: "Video learning of High School Mathematics Curriculum Courses can improve students' cognitive abilities and learning independence" (Mean = 4.23, S.D. = 0.874) highlights students' acknowledgment of the cognitive advantages associated with video-based instruction a key element regarding the flipped learning model. Meanwhile, the lowest-rated item was: "I applied my out-of-class experiences and learned from the practical applications" (Mean = 3.97, S.D. = 0.731). Although still within the "Agree" range, this suggests that students may encounter challenges when relating mathematical theories to real-world contexts. Likewise, the item "I am able to focus better when the lecture is broken into smaller parts" (Mean = 4.01, S.D. = 0.904) implies that while many students find segmented lessons helpful, focus and learning preferences can vary from one learner to another.

In summary, the results point to the success of the Flipped learning method in improving self-directed learning. Students are encouraged to adopt personalized learning strategies, draw real-life connections to abstract concepts, and advance through the content at their own speed. These findings support the conclusions of Bergmann and Sams (2021), who reported that flipped learning environments promote stronger independent learning habits and greater student ownership of academic progress.

Table 2.3 Extent of the Use ff Flipped Classroom Approach Among Junior High School Students ff Parang National High School - Main Campus in the Context of Learning Independently.

	Statements	Mean	S.D	Rating
1	I am able to focus better when the lecture is broken into smaller parts.	4.01	.904	Agree

2	When I study for this class, I try to connect what I am learning with my own experiences.	4.29	.743	Agree
3	I make up my own examples to help me understand the important concept I am studying for this class.	4.31	.662	Agree
4	I had to work hard to learn the content.	4.16	.929	Agree
5	I applied my out-of-class experiences and learned from the practical applications.	3.97	.731	Agree
6	I explored my own strategies for learning.	4.16	.748	Agree
7	I can able to work at my own pace.	4.10	.859	Agree
8	Students have more choice in how they demonstrate their learning	4.02	.752	Agree
9	Students are more likely to have a choice in what they want to solve in the classroom.	4.07	.844	Agree
10	Video learning of High School Mathematics Curriculum Courses can improve students' cognitive abilities and learning independence.	4.23	.874	Agree
	Total Weighted Mean	4.1320	.51755	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

3. Is there a significant difference in the extent of the use of flipped classroom approach among junior high school students of Parang National High School - Main Campus where they are grouped according to: 3.1 Age, 3.2 Gender, 3.3 Grade Level, and 3.4 Parents' Educational Attainment?

3.1 According to Age

Table 3.1 this section presents an overview of the differences in the application of the flipped classroom model among junior high school students at Parang National High School – Main Campus, grouped by age. The analysis is derived from the results of an ANOVA test, which includes the sum of squares, degrees of freedom (df), mean squares, F-values, and significance levels (Sig.) for three specific aspects: gaining new mathematical knowledge, using video lessons, and participating in self-directed learning.

In the area of acquiring new mathematical concepts, the analysis yielded a between-group sum of squares of 1.992, a mean square of 0.664, and an F-value of 2.57. The significance level recorded was 0.059, which exceeds the standard threshold of 0.05. This indicates that age does not significantly influence students' engagement with the flipped classroom method when it comes to learning new concepts. Therefore, students across different age groups tend to have similar experiences and perceptions regarding this aspect.

Conversely, a notable statistical difference was identified in students' use of video lessons. The data show a between-group sum of squares of 3.958, a mean square of 1.319, and an F-value of 4.15, with a Sig. value of 0.008—well below the 0.05 threshold. This outcome suggests that students' interaction with video-based learning varies with age. It is possible that older students demonstrate a greater ability to utilize video content effectively to support their learning.

A similar trend appears in the domain of independent learning. The between-group sum of squares was 4.407, with a mean square of 1.469 and an F-value of 6.39. The significance level of 0.001 indicates a clear statistical difference among age groups. This implies that students' capacity for independent study using the flipped classroom model is influenced by their age,

with older learners likely showing more advanced self-directed learning behaviors than their younger counterparts.

Overall, these findings reveal that while age does not significantly affect students' use of the flipped classroom model for grasping new mathematical concepts, it does play a meaningful role in how students engage with video materials and in their ability to learn independently. Therefore, the null hypothesis stating that no substantial differences exist in the extent of flipped classroom use when students are grouped by age is rejected.

Table 2.1 Extent of the Use ff Flipped Classroom Approach Among Junior High School Students ff Parang National High School - Main Campus in the Context of Learning New Mathematics Concepts.

	Statements	Mean	S.D	Rating
1	The flipped classroom allowed more time complete problem sets (worksheets) in class.	4.27	.750	Agree
2	When the classroom was flipped, I understood problem sets (worksheets) better.	3.96	.764	Agree
3	In this course, I often felt excited about learning new concepts.	4.05	.744	Agree
4	The challenge of math appeals to me.	4.05	.783	Agree
5	I feel well-prepared for the next level of study in this field.	4.13	.747	Agree
6	I learned a lot of new mathematics content in this classroom.	4.20	.752	Agree
7	The learning activities focused on real life applications and improved my learning.	4.01	.859	Agree
8	I enjoy learning new things in this class.	4.12	.891	Agree
9	The flipped learning encourages me to have creative thinking and evaluation.	3.92	.929	Agree
10	I am satisfied with the content and topics of the learning materials.	4.07	.756	Agree
	Total Weighted Mean	4.0780	.52060	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

3.2 In the context of Learning Through Video Lessons

Table 2.2 this section explores how junior high school students at Parang National High School – Main Campus utilize the flipped classroom approach specifically in relation to video-based learning. The computed overall weighted mean is 3.9500, with a variability of 0.58990, which aligns with the descriptive interpretation of “Agree.” This indicates that students generally find video lessons to be a valuable tool in supporting their learning of mathematics.

The statement receiving the highest mean rating was: “Learning videos for High School Mathematics Curriculum Courses are useful in lectures” (Mean = 4.28, S.D. = 0.805), demonstrating a strong student appreciation for the instructional role of videos in their math education. Following closely, “The video lectures helped me understand math concepts” (Mean = 4.26, S.D. = 0.691) received a similarly high score, suggesting that students view video content as an effective medium for building mathematical understanding. In addition, the statement “When I watched the videos, I took notes” (Mean = 4.21, S.D. = 0.913) reveals that many students engage actively with video materials, a habit that likely supports better retention and comprehension of the subject matter.

On the other hand, the lowest mean rating was observed for the statement: "I was more engaged watching the videos than I was during in-class lectures" (Mean = 3.43, S.D. = 1.121), which falls under the category of "Partially Agree." This suggests that while students acknowledge the usefulness of video content, some still find traditional face-to-face lectures more engaging. Similarly, "I would rather watch a video lecture than do math problems for homework" (Mean = 3.49, S.D. = 1.078) indicates that many students do not see video learning as a full replacement for hands-on practice with mathematical problems.

Overall, these results suggest that video lessons are a generally well-received component of the flipped pedagogy. They offer students the flexibility to revisit topics at a pace that suits them and learn through a combination of visual and auditory cues. These findings support the research of Hew and Lo (2018), who concluded that the integration of video instruction in flipped classrooms promotes deeper understanding and greater student autonomy in learning.

Table 2.2 Extent of the Use ff Flipped Classroom Approach Among Junior High School Students ff Parang National High School - Main Campus in the Context of Learning Through Video Lessons.

	Statements	Mean	S.D	Rating
1	The video lectures helped me understand math concepts.	4.26	.691	Agree
2	I would rather watch a video lecture than do math problems for homework.	3.49	1.078	Partially Agree
3	I was more engaged watching the videos than was during in-class lectures.	3.43	1.121	Partially Agree
4	I watched the video lectures prior to class.	3.98	.964	Agree
5	I often paused the videos when watching them in order to process the content.	4.11	.909	Agree
6	I rewound some videos or watched them more than once.	3.97	.834	Agree
7	I fast forwarded the videos when watching them.	3.62	1.023	Agree
8	When I watched the videos, I took notes.	4.21	.913	Agree
9	Video learning of the High School Mathematics Curriculum Courses looks interesting from a visual and audio perspective.	4.15	.880	Agree
10	Learning videos for High School Mathematics Curriculum Courses are useful in lectures.	4.28	.805	Agree
	Total Weighted Mean	3.9500	.58990	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

2.3 In the context of Learning Independently

Table 2.3 this section examines how junior high school students at Parang National High School – Main Campus experience the flipped classroom model in terms of promoting independent learning. The computed overall weighted mean is 4.1320, with a standard deviation of 0.51755, corresponding to an interpretation of "Agree." This indicates that students generally view the flipped classroom as a supportive strategy for developing self-reliant learning habits, especially in mathematics.

Among the items assessed, the statement "I make up my own examples to help me understand the important concept I am studying for this class" received the highest mean score (Mean = 4.31, S.D. = 0.662). This suggests that students frequently engage in independent learning by constructing their own examples, helping to deepen their understanding of mathematical concepts. Another highly rated item was "When I study for this class, I try to connect what I am learning with my own experiences" (Mean = 4.29, S.D. = 0.743), indicating that students find

value in relating mathematical ideas to personal experiences, which likely enhances both comprehension and memory.

The statement "Video learning of High School Mathematics Curriculum Courses can improve students' cognitive abilities and learning independence" (Mean = 4.23, S.D. = 0.874) also received a strong positive response, showing that students recognize the mental and autonomous learning benefits of video instruction as a key part of the flipped learning strategy. On the other end of the spectrum, the lowest-rated item was "I applied my out-of-class experiences and learned from the practical applications" (Mean = 3.97, S.D. = 0.731). Although still interpreted as "Agree," this suggests that some learners face challenges in linking classroom learning with real-world situations. Additionally, the item "I am able to focus better when the lecture is broken into smaller parts" (Mean = 4.01, S.D. = 0.904) shows that while students generally respond well to segmented lessons, differences in individual attention span and learning preferences may influence their overall focus.

In conclusion, these results support the idea that the flipped learning model contributes meaningfully to independent learning by motivating students to personalize their study methods, connect mathematical content to real-life contexts, and proceed at a pace suited to their individual needs. These observations align with the findings of Bergmann and Sams (2021), who reported that flipped learning environments promote stronger self-guided learning skills and greater student ownership of the learning process.

Table 2.3 Extent of the Use ff Flipped Classroom Approach Among Junior High School Students ff Parang National High School - Main Campus in the Context of Learning Independently.

	Statements	Mean	S.D	Rating
1	I am able to focus better when the lecture is broken into smaller parts.	4.01	.904	Agree
2	When I study for this class, I try to connect what I am learning with my own experiences.	4.29	.743	Agree
3	I make up my own examples to help me understand the important concept I am studying for this class.	4.31	.662	Agree
4	I had to work hard to learn the content.	4.16	.929	Agree
5	I applied my out-of-class experiences and learned from the practical applications.	3.97	.731	Agree
6	I explored my own strategies for learning.	4.16	.748	Agree
7	I can able to work at my own pace.	4.10	.859	Agree
8	Students have more choice in how they demonstrate their learning	4.02	.752	Agree
9	Students are more likely to have a choice in what they want to solve in the classroom.	4.07	.844	Agree
10	Video learning of High School Mathematics Curriculum Courses can improve students' cognitive abilities and learning independence.	4.23	.874	Agree
	Total Weighted Mean	4.1320	.51755	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

2. What is the extent of the use of flipped classroom approach among junior high school students of Parang National High School - Main Campus in the context of: 2.1 Learning New Mathematics Concepts, 2.2 Learning Through Video Lessons, and 2.3 Learning Independently?

Table 2 The table presents the level of professional competencies exhibited by elementary school teachers within the Division of Sulu, focusing on several core areas: classroom management, curriculum planning and assessment, instructional delivery, student support, professional collaboration, technology integration, and ongoing professional growth. The computed overall weighted mean is 4.1251, having a standard deviation of 0.63009, Which aligns with a descriptive rating of "High Level." This indicates that teachers, on the whole, consider themselves well-equipped with the professional skills necessary for effective classroom instruction.

Notably, teachers received high ratings in multiple areas of professional practice. These include acquiring essential instructional materials and resources, continuously reviewing and refining learning objectives, preparing lesson content, addressing learner needs through counseling or referrals, fostering collaboration with fellow educators and educational stakeholders, keeping up-to-date with certifications in educational technology, and actively engaging in professional development activities such as attending seminars, workshops, and conferences. These results underscore the competence and preparedness of educators in the Division of Sulu to meet instructional demands and support student learning effectively.

Table 2. Level of professional skills of elementary school teachers at the Division of Sulu.

Managing Learning Environment		Mean	S.D.	Rating
1	Obtain required equipment, systems, tools, supplies and materials.	4.0700	.71249	High Level
2	Set up and maintain instructional systems, equipment and/or tools.	4.0000	.70888	High Level
3	Supervise learning environment.	4.1100	.67838	High Level
4	Evaluate and monitor the safety of the instructional areas and practices.	4.0900	.68867	High Level
	Total Weighted Mean	*4.0675*	*.61987*	*High Level*
Developing Outcomes, Assessment and Curricula		Mean	S.D.	Rating
1	Identify, evaluate and modify current outcomes.	4.1400	.67280	High Level
2	Create, evaluate and modify curriculum and assessment.	4.1100	.70025	High Level
3	Implement curriculum, outcomes and assessment.	4.1150	.68858	High Level
4	Integrate curriculum with other faculty in the department and in other area/ institution.	4.1050	.67547	High Level
	Total Weighted Mean	*4.1175*	*.59989*	*High Level*
Providing Learner Instruction		Mean	S.D.	Rating
1	Prepare and/or gather current instructional materials and equipment.	4.3400	.69050	High Level
2	Provide individual and group instruction.	4.2900	.69159	High Level
3	Initiate, develop and implement student assessment.	4.2550	.70174	High Level
4	Modify instructional material and methods based on student and industry assessment and feedback.	4.1700	.72368	High Level
	Total Weighted Mean	*4.2638*	*.61809*	*High Level*
Providing Support and Guidance to Learners		Mean	S.D.	Rating
1	Respond to student needs and provide information or referrals.	4.2450	.71240	
2	Assist students with job placement.	4.2650	.74670	High Level

3	Provide academic and career advising.	4.2250	.73967	High Level
4	Serve as student activity advisors as applicable.	4.1750	.76636	High Level
	Total Weighted Mean	*4.2275*	*.64494*	*High Level*
Creating and Maintaining a Professional Environment		Mean	S.D.	Rating
1	Collaborate with college staff, faculty and students.	4.2300	.80644	High Level
2	Serve on department and college committees.	4.0150	.84162	High Level
3	Maintain current knowledge of the field.	4.0800	.74591	High Level
4	Develop a professional development plan.	4.1300	.73880	High Level
	Total Weighted Mean	*4.1138*	*.68719*	*High Level*
Learning and Adapting New Technologies		Mean	S.D.	Rating
1	Obtain and maintain certification on program-specific technology.	4.0800	.69716	High Level
2	Maintain current knowledge of technology in the field.	3.9750	.68316	High Level
3	Identify, evaluate and implement emerging technologies according to industry needs.	3.9550	.70388	High Level
4	Identify and evaluate and implement new instructional technologies.	3.9950	.66874	High Level
	Total Weighted Mean	*4.0012*	*.58105*	*High Level*
Participating for Professional Growth and Development		Mean	S.D.	Rating
1	Join professional organizations, groups, or association within or outside the institution.	4.0850	.79431	High Level
2	Participate to seminars, assemblies, conventions, colloquium, etc.	4.2850	.72554	High Level
3	Initiate and publish a research locally, nationally or internationally.	4.0350	.85876	High Level
4	Enroll for higher degrees (MA/Ed.D,PhD), certification programs and the like.	4.0400	.93422	High Level
	Total Weighted Mean	4.1112	.65963	High Level
	Overall Total Weighted Mean	*4.1251*	*.63009*	*High Level*

Legend: (5) 4.50-5.00=Very High Level (VHE); (4) 3.50-4.49=High Level (HL; (3) 2.50- 3.49=Moderate Level (ML); (2) 1.50- 2.49=Low Level (LL); (1) 1.00- 1.49=Very Low Level (VLL)

3. What is the level of teaching engagement of elementary school teachers at the Division of Sulu in the following dimensions: 3.1 Vigor in Teaching; 3.2 Dedication in Teaching; and 3.3 Absorption in Teaching?

Table 3 the table presents data on the level of teaching engagement among primary school educators within the Division of Sulu, examining three primary dimensions: vigor, dedication, and absorption. The computed overall weighted mean from the responses is 4.3188, having a standard deviation of 0.61653, corresponding to the descriptive rating of “Often,” which reflects a “High Level” of engagement. This indicates that, overall, teachers see themselves as actively and positively engaged in their professional responsibilities.

Respondents reported maintaining energy and psychological resilience throughout their instructional activities, consistently putting forth effort and demonstrating perseverance despite challenges. Additionally, the responses reveal a strong sense of meaning and enthusiasm in their work, with teachers expressing pride in their role and embracing the demands of the teaching

profession. A notable aspect of their engagement refers to the extent of involvement in their tasks—many described becoming so focused and immersed in teaching that they experience enjoyment, lose track of time, and find it difficult to detach from their instructional responsibilities.

In detail, the teacher-respondents consistently rated the following items as occurring "Often": "I feel motivated to go to work every morning," "I feel full of energy at work," "I persist even when things aren't going well," "Teaching is a challenging job for me," "My teaching job inspires me," "I am enthusiastic about teaching," "I become completely focused when I teach," "Time passes quickly when I am teaching," and "I get completely absorbed in my teaching."

Table 3. level of teaching engagement of elementary school teachers at the Division of Sulu in the following dimensions: Vigor in Teaching, Dedication in Teaching, and Absorption in Teaching.

Vigor in Teaching		Mean	S.D.	Rating
1	When i get up in the morning, i feel like going to work	4.4400	.62317	Often
2	At my work, i feel bursting with energy	4.3250	.60929	Often
3	At my work i always persevere, even when things do not go well	4.2650	.62186	Often
4	I can continue working for very long periods at a time	4.2150	.74939	Often
5	At my job, i am very resilient, mentally	4.2650	.70517	Often
6	At my job, i feel strong and vigorous	4.3300	.65055	Often
	Total Weighted Mean	*4.3067*	*.50110*	*Often*
Dedication in Teaching		Mean	S.D.	Rating
1	To me, my teaching job is challenging	4.5800	.59613	Always
2	My teaching job inspires me	4.5950	.60232	Always
3	I am enthusiastic about my teaching job	4.4600	.64846	Always
4	I am proud on the teaching job that I do	4.5650	.61454	Always
5	I find the teaching job that I do full of meaning and purpose	4.4400	.69195	Often
	Total Weighted Mean	*4.5280*	*.53502*	*Always*
Absorption in Teaching		Mean	S.D.	Rating
1	When I am teaching, I forget everything else around me	4.0500	.86675	Often
2	Time flies when i am teaching	4.1700	.90842	Often
3	I get carried away when i am teaching	4.0900	.96777	Often
4	It is difficult to detach myself from my teaching job	4.0800	.93163	Often
5	I am immersed in my teaching job	4.1200	.93271	Often
6	I feel happy when I am teaching intensely	4.2200	.94662	Often
	Total Weighted Mean	*4.1217*	*.81354*	*Often*
	Overall Total Weighted Mean	4.3188	.61653	Often

Legend: (5) 4.50-5.00=Always (A); (4) 3.50-4.49=Often (O); (3) 2.50- 3.49=Sometimes (S); (2) 1.50- 2.49=Seldom (S); (1) 1.00- 1.49=Never (N)

4. Is there a significant difference in the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to: 4.1 Gender; 4.2 Age; 4.3 Length of service; 4.4 Educational attainment; and 4.5 Civil status?

4.1 According to Gender

Table 4.1 the table illustrates the variations in the extent of professional skills among primary school teachers within the Division of Sulu, categorized by gender. The analysis reveals that, except for the sub-domains "Learning and Adapting New Technologies" and "Participating in Professional Growth," the observed average differences, t-statistics, and significance values for the other skill areas are statistically significant at the 0.05 threshold. This indicates that male and female respondents tend to evaluate their professional competencies differently in most of the measured domains.

These results suggest that gender may play a role in shaping how educators perceive and assess their own professional capabilities. This could mean that male teachers interpret or value certain skills differently than their female counterparts, or the reverse

Therefore, it can be concluded that gender influences the way professional skills are perceived and reported by teachers in the Division of Sulu. Therefore, the null hypothesis "There is no significant difference in the level of professional skills of elementary school teachers in the Division of Sulu when categorized according to gender" is rejected.

Table 4.1 Differences in the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to gender.

Variables	Grouping	Mean	S.D.	Mean Diff.	t	Sig	Description
Managing learning environment	Male	4.2091	.54170	.19530*	2.005	.046	Significant
	Female	4.0138	.64062				
Developing Outcomes, Assessment and Curricula	Male	4.2682	.58897	.20784*	2.209	.028	Significant
	Female	4.0603	.59605				
Providing learner instruction	Male	4.4545	.58351	.26317*	2.732	.007	Significant
	Female	4.1914	.61732				
Providing support and guidance to learners	Male	4.4818	.59093	.35078*	3.532	.001	Significant
	Female	4.1310	.64015				
Creating and maintaining a professional environment	Male	4.3455	.66404	.31959*	2.995	.003	Significant
	Female	4.0259	.67747				
Learning and adapting new technologies	Male	4.0545	.57673	.07351	.798	.426	Not Significant
	Female	3.9810	.58339				
Participating for Professional Growth	Male	4.2591	.66834	.20392	1.966	.051	Not Significant
	Female	4.0552	.64983				

*Significant at alpha .05

4.2 According to Age

Table 4.2 the table presents a comparison of the professional skills of elementary school teachers in the Division of Sulu, grouped according to their length of service. The findings indicate that none of the sub-domains related to professional competence exhibit statistically notable

differences at the 0.05 threshold. This means that teaching experience, measured in years of service, does not appear to significantly affect how teachers evaluate their professional skills.

Whether educators with 5 years or fewer of experience, 6 to 10 years of experience, and 11 to 15 years of experience, or more than 16 years, their self-assessments regarding professional competencies remain largely uniform. The findings indicate that the number of years in teaching does not substantially influence teachers' perceptions of their professional strengths or capabilities.

Based on these outcomes, it can be inferred that educators across various experience levels share a common understanding and evaluation of their professional skills. Therefore, the null hypothesis "There is no significant difference in the level of professional skills of elementary school teachers in the Division of Sulu when data are categorized according to length of service"—is accepted.

Table 4.2 Differences in the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to age.

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Managing learning environment	Between Groups	2.268	3	.756	1.997	.116	Not Significant
	Within Groups	74.196	196	.379			
	Total	76.464	199				
Developing Outcomes, Assessment and Curricula	Between Groups	1.444	3	.481	1.344	.261	Not Significant
	Within Groups	70.170	196	.358			
	Total	71.614	199				
Providing learner instruction	Between Groups	1.965	3	.655	1.734	.161	Not Significant
	Within Groups	74.060	196	.378			
	Total	76.025	199				
Providing support and guidance to learners	Between Groups	1.222	3	.407	.979	.404	Not Significant
	Within Groups	81.552	196	.416			
	Total	82.774	199				
Creating and maintaining a professional environment	Between Groups	.563	3	.188	.394	.758	Not Significant
	Within Groups	93.412	196	.477			
	Total	93.975	199				
Learning and adapting new technologies	Between Groups	1.771	3	.590	1.769	.154	Not Significant
	Within Groups	65.416	196	.334			
	Total	67.187	199				
Participating for Professional Growth and Development	Between Groups	.864	3	.288	.659	.578	Not Significant
	Within Groups	85.723	196	.437			
	Total	86.587	199				

*Significant at alpha .05

Length of Service	Number of Teachers	Percent
5 years & below	47	23.5%
6-10 years	56	28.0%
11-15 years	41	20.5%
16 years & above	56	28.0%
Total	200	100%

4.3 According to Length of Service

Table 4.3 the table outlines the comparison of professional skills among elementary school teachers in the Division of Sulu based on their years of service. The analysis shows that none of the sub-domains related to professional competence reached statistical significance with a 0.05 p-value alpha level. This indicates that differences in teaching experience do not result in meaningful variations in how teachers assess their professional skills within the division.

The results reveal that teachers with 5 years or less, from 6 to 10 years, 11 to 15 years, and 16 years or more of service tend to evaluate their professional competencies in a similar manner. This suggests that increased tenure in the teaching profession does not automatically result in a change in how educators perceive their level of professional skill.

Based on these results, it can be inferred that teachers, regardless of how long they have been in service, share consistent views regarding their professional capabilities. Consequently, the null hypothesis “There is no significant difference in the level of professional skills of elementary school teachers in the Division of Sulu when data are categorized according to length of service” is retained.

Table 4.3 Differences in the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to length of service.

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Managing learning environment	Between Groups	2.110	3	.703	1.854	.139	Not Significant
	Within Groups	74.353	196	.379			
	Total	76.464	199				
Developing Outcomes, Assessment and Curricula	Between Groups	1.947	3	.649	1.826	.144	Not Significant
	Within Groups	69.667	196	.355			
	Total	71.614	199				
Providing learner instruction	Between Groups	1.719	3	.573	1.512	.213	Not Significant
	Within Groups	74.305	196	.379			
	Total	76.025	199				
Providing support and guidance to learners	Between Groups	1.596	3	.532	1.285	.281	Not Significant
	Within Groups	81.178	196	.414			
	Total	82.774	199				
Creating and maintaining a professional environment	Between Groups	.484	3	.161	.339	.797	Not Significant
	Within Groups	93.490	196	.477			
	Total	93.975	199				
Learning and adapting new technologies	Between Groups	2.214	3	.738	2.226	.086	Not Significant
	Within Groups	64.973	196	.331			
	Total	67.187	199				
Participating for Professional Growth and Development	Between Groups	1.707	3	.569	1.314	.271	Not Significant
	Within Groups	84.880	196	.433			
	Total	86.587	199				

*Significant at alpha .05

4.4 According to Educational Attainment

Table 4.4 The table presents the variation in professional skills among elementary school teachers in the Division of Sulu when categorized by their highest level of educational attainment. The analysis indicates that all sub-domains of professional competence demonstrate differences that are statistically significant at the 0.05 alpha level. This suggests that teachers' perceptions of their professional skills vary notably based on their academic qualifications.

More specifically, the findings imply that educators with doctoral degrees tend to evaluate professional skills differently possibly more positively compared to those holding only a bachelor's level qualification coursework, a completed master's degree, or a master's degree with ongoing doctoral studies. The differences may also occur in the opposite direction, indicating a complex relationship between academic achievement and professional self-assessment.

These results highlight that a teacher's level of educational attainment influences how they perceive and assess their professional competencies. As academic credentials increase, there appears to be a shift in how teachers view the nature and extent of their professional skills.

In conclusion, educational attainment exerts a notable impact on shaping teachers' evaluations of their professional abilities. Consequently, the null hypothesis "There is no significant difference in the level of professional skills of elementary school teachers in the Division of Sulu when data are categorized according to educational attainment" is rejected.

Table 4.4 Differences in the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to educational attainment.

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Managing learning environment	Between Groups	7.795	4	1.949	5.534*	.000	Significant
	Within Groups	68.668	195	.352			
	Total	76.464	199				
Developing Outcomes, Assessment and Curricula	Between Groups	6.328	4	1.582	4.725*	.001	Significant
	Within Groups	65.286	195	.335			
	Total	71.614	199				
Providing learner instruction	Between Groups	6.185	4	1.546	4.317*	.002	Significant
	Within Groups	69.840	195	.358			
	Total	76.025	199				
Providing support and guidance to learners	Between Groups	10.625	4	2.656	7.179*	.000	Significant
	Within Groups	72.149	195	.370			
	Total	82.774	199				
Creating and maintaining a professional environment	Between Groups	10.300	4	2.575	6.001*	.000	Significant
	Within Groups	83.675	195	.429			
	Total	93.975	199				
Learning and adapting new technologies	Between Groups	3.396	4	.849	2.595*	.038	Significant
	Within Groups	63.791	195	.327			
	Total	67.187	199				
Participating for Professional Growth and Development	Between Groups	13.902	4	3.476	9.324*	.000	Significant
	Within Groups	72.685	195	.373			
	Total	86.587	199				

*Significant at alpha .05

A follow-up analysis employing the Tukey An assessment was carried out to identify grouped based on educational qualifications, exhibited differences in professional skills within the group of elementary educators in the Division of Sulu. The results of the analysis, displayed in Table 4.4.1, show that the mean differences in various sub-categories of professional skills were

calculated by subtracting the mean scores of lower educational attainment groups from those with higher educational qualifications.

Managing Learning Environment: Teacher-respondents holding a Master's Degree with Doctoral Units showed a mean difference of -0.60385 (Standard Error = 0.13212) with a p-value of 0.000, which is statistically significant at the alpha = 0.05 level when compared to the group with a Bachelor's Degree. This indicates that teachers with a Master's Degree with Doctoral Units tend to assess their professional skills in managing the learning environment more effectively than those with just a Bachelor's Degree.

Developing Outcomes, Assessment, and Curricula: Teacher-respondents with Master's Degrees with Doctoral Units showed a mean difference of -0.54979 (Standard Error = 0.12883) and a p-value of 0.000, which reaches significance a the alpha = 0.05 level when compared to those with a Bachelor's Degree. This suggests that teachers with higher educational attainment (Master's Degree with Doctoral Units) tend to have a more favorable perception of their skills in developing outcomes, assessments, and curricula than those holding only a Bachelor's Degree.

Providing Learner Instruction: The group of teacher-respondents with Master's Degrees with Doctoral Units showed a mean difference of -0.49765 (Standard Error = 0.13325) and a p-value of 0.002, which reaches significance a the alpha = 0.05 level when compared to those with a Bachelor's Degree. This suggests that teachers with higher educational qualifications (Master's Degree with Doctoral Units) tend to have a more favorable perception of their skills in providing learner instruction, indicating that higher educational attainment is associated with a better perception of instructional abilities.

Providing Support and Guidance to Learners: Teacher-respondents with Master's Degrees with Doctoral Units showed a mean difference of -0.64252 (Standard Error = 0.13543) and a p-value of 0.000, which reaches significance the alpha = 0.05 level when compared to those with a Bachelor's Degree. This implies that teachers with advanced degrees are more confident in their ability to assess their skills in providing support and guidance to learners, suggesting that higher educational qualifications are linked to a stronger perception of competence in this area.

Creating and Maintaining a Professional Environment: Teacher-respondents with Master's Degrees with Doctoral Units showed a mean difference of -0.63162 (Standard Error = 0.14585) and a p-value of 0.000, which reaches significance the alpha = 0.05 level when compared to those with a Bachelor's Degree. This suggests that teachers with higher educational attainment (Master's Degree with Doctoral Units) have a more refined understanding of how to create and maintain a professional environment, compared to those with lower educational qualifications. This highlights the role of advanced education in enhancing teachers' perceptions of their professional environment management skills.

Learning and Adapting New Technologies: Teacher-respondents with Master's Degrees with Doctoral Units showed a mean difference of -0.38141 (Standard Error = 0.12735) and a p-value of 0.025, which reaches significance the alpha = 0.05 level when compared to those with a Bachelor's Degree. This result indicates that teachers with higher educational qualifications perceive themselves as more proficient in learning and adapting to new technologies. It suggests that advanced educational attainment contributes to a stronger confidence in utilizing and integrating technology into their teaching practices.

Participating for Professional Growth and Development: Teacher-respondents with Master's Degrees with Doctoral Units showed a mean difference of -0.69808 (Standard Error = 0.13593) and a p-value of 0.000, which reaches significance a the alpha = 0.05 level when compared to those with a Bachelor's Degree. This finding highlights that teachers with higher

levels of education, specifically those with a Master's Degree with Doctoral Units, are more likely to perceive themselves as actively engaged in professional growth and development activities. It suggests that advanced educational qualifications are associated with a greater commitment to continuous professional learning and development.

Table 4.4.1 Post Hoc Analysis: Differences in the means of groups classified under the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to educational attainment.

Dependent Variables	(I) Grouping by Educational Attainment	(J) Grouping by Educational Attainment	Mean Difference (I-J)	Std. Error	Sig.
Managing learning environment	Bachelor's degree	Bachelor's degree w/ master's units	-.10341	.10916	.878
		Master's degree	-.14792	.13633	.814
		Master's degree w/ doctoral units	-.60385*	.13212	.000
		Doctorate degree	-.29375	.16100	.362
Developing Outcomes, Assessment and Curricula	Bachelor's degree	Bachelor's degree w/ master's units	-.17828	.10644	.452
		Master's degree	-.15556	.13293	.768
		Master's degree w/ doctoral units	-.54979*	.12883	.000
		Doctorate degree	-.23368	.15699	.571
Providing learner instruction	Bachelor's degree	Bachelor's degree w/ master's units	-.23497	.11009	.210
		Master's degree	-.30694	.13749	.172
		Master's degree w/ doctoral units	-.49765*	.13325	.002
		Doctorate degree	-.27049	.16237	.458
Providing support and guidance to learners	Bachelor's degree	Bachelor's degree w/ master's units	-.20240	.11189	.371
		Master's degree	-.20903	.13974	.566
		Master's degree w/ doctoral units	-.64252*	.13543	.000
		Doctorate degree	-.54757*	.16503	.009
Creating and maintaining a professional environment	Bachelor's degree	Bachelor's degree w/ master's units	-.33573*	.12050	.046
		Master's degree	-.19653	.15049	.688
		Master's degree w/ doctoral units	-.63162*	.14585	.000
		Doctorate degree	-.46215	.17773	.074
Learning and adapting new technologies	Bachelor's degree	Bachelor's degree w/ master's units	-.02652	.10521	.999
		Master's degree	-.09375	.13140	.953
		Master's degree w/ doctoral units	-.38141*	.12735	.025
		Doctorate degree	-.22396	.15518	.601
Participating for Professional Growth and Development	Bachelor's degree	Bachelor's degree w/ master's units	-.36023*	.11231	.013
		Master's degree	-.33750	.14026	.118
		Master's degree w/ doctoral units	-.69808*	.13593	.000
		Doctorate degree	-.63437*	.16564	.002

* The mean difference is significant at the 0.05 level.

4.5 According to Civil Status

Table 4.5 this section examines the differences in the professional skills of elementary school teachers in the Division of Sulu based on their civil status. The data, as shown in the table, indicate that the computed F-values and corresponding p-values for all dimensions of professional skills do not reach statistically significant at the 0.05 level of significance. This suggests that variations in civil status whether a teacher is married, single, separated, or widowed do not result in significant differences in how teachers perceive their professional competencies.

The findings imply that a teacher's marital status does not play a meaningful role in shaping their self-assessment of professional skills. In other words, civil status does not seem to influence how teachers perceive their capabilities in various areas of teaching, including managing learning environments, developing curricula, or providing learner instruction.

Therefore, it can be concluded that teachers in the Division of Sulu, regardless of their civil status, hold similar perceptions regarding their professional skills. As such, the hypothesis stating, "There is no significant difference in the level of professional skills of elementary school teachers at the Division of Sulu when categorized according to civil status," is accepted.

Table 4.5 Differences in the level of professional skills of elementary school teachers at the Division of Sulu when data are categorized according to civil status.

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Managing learning environment	Between Groups	.270	2	.135	.349	.706	Not Significant
	Within Groups	76.194	197	.387			
	Total	76.464	199				
Developing Outcomes, Assessment and Curricula	Between Groups	.874	2	.437	1.217	.298	Not Significant
	Within Groups	70.740	197	.359			
	Total	71.614	199				
Providing learner instruction	Between Groups	.132	2	.066	.171	.843	Not Significant
	Within Groups	75.893	197	.385			
	Total	76.025	199				
Providing support and guidance to learners	Between Groups	.085	2	.043	.101	.904	Not Significant
	Within Groups	82.689	197	.420			
	Total	82.774	199				
Creating and maintaining a professional environment	Between Groups	1.116	2	.558	1.184	.308	Not Significant
	Within Groups	92.858	197	.471			
	Total	93.975	199				
Learning and adapting new technologies	Between Groups	.605	2	.302	.894	.411	Not Significant
	Within Groups	66.583	197	.338			
	Total	67.187	199				
Participating for Professional Growth and Development	Between Groups	.355	2	.177	.405	.667	Not Significant
	Within Groups	86.233	197	.438			
	Total	86.587	199				

*Significant at alpha .05

5. Is there a significant difference in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to: 5.1 Gender; 5.2 Age; 5.3 Length of service; 5.4 Educational attainment; and 5.5 Civil status?

5.1 According to Gender

Table 5.1 this section explores whether gender plays a role in the varying levels of teaching engagement among elementary school teachers in the Division of Sulu. According to the data presented in the table, no statistically significant differences were found in most sub-categories of teaching engagement at the 0.05 alpha level, except for the "Absorption in Teaching" sub-category. These findings indicate that male and female teachers generally perceive their level of teaching engagement similarly.

The finding indicates that being male or female does not substantially affect how teachers assess their engagement with teaching. Both male and female teachers in the Division of Sulu appear to have similar views on their teaching vigor, dedication, and overall engagement in the classroom.

Based on the findings, gender does not have a significant effect on the teaching engagement levels reported by the teacher-respondents. Therefore, the hypothesis stating that 'there is no significant difference in the level of teaching engagement among elementary school teachers in the Division of Sulu based on gender' is supported.

Table 5.1Differences in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to gender

Variables	Grouping	Mean	S.D.	Mean Diff.	t	Sig	Description
Vigor in Teaching	Male	4.2545	.48310	-.07189	-.906	.366	Not Significant
	Female	4.3264	.50799				
Dedication in Teaching	Male	4.6109	.50099	.11436	1.353	.178	Not Significant
	Female	4.4966	.54574				
Absorption in Teaching	Male	4.3152	.53927	.26688	2.089	.038	Significant
	Female	4.0483	.88648				

*Significant at alpha .05

5.2 According to Age

Table 5.2 this section examines the differences in the level of teaching engagement among elementary school teachers in the Division of Sulu, categorized by age. According to the data presented in the table, all sub-categories related to teaching engagement, except for "Dedication in Teaching," show no significant differences in mean values, F-values, and p-values at an alpha level of 0.05. This suggests that although teachers fall into different age brackets, their perceptions of teaching engagement are largely consistent across these groups.

The exception for "Dedication in Teaching" indicates that there may be a slight difference in how teachers in various age groups perceive their dedication to teaching, though this specific sub-category is not fully explored in the context of the analysis. However, in general, it can be concluded that the perceptions of teaching engagement do not significantly vary across age groups.

Teachers from the 30 years and below, 31-40 years, 41-50 years, and 51 years and above age categories seem to share similar views on teaching engagement. Therefore, it can be reasonably concluded that age does not significantly influence how teacher-respondents perceive the level of teaching engagement.

In conclusion, the hypothesis stating, “There is no significant difference in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to age” is accepted.

Table 5.2 Differences in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to age

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Vigor in Teaching	Between Groups	1.529	3	.510	2.062	.107	Not Significant
	Within Groups	48.440	196	.247			
	Total	49.969	199				
Dedication in Teaching	Between Groups	3.508	3	1.169	4.287*	.006	Significant
	Within Groups	53.456	196	.273			
	Total	56.963	199				
Absorption in Teaching	Between Groups	4.165	3	1.388	2.133	.097	Not Significant
	Within Groups	127.542	196	.651			
	Total	131.706	199				

*Significant at alpha .05

5.3 According to Length of Service

Table 5.3 this section analyzes the differences in the level of teaching engagement among elementary school teachers at the Division of Sulu, based on their length of service. According to the table, it is evident that, with the exception of the "Absorption in Teaching" sub-category, none of the other sub-categories show statistically significant differences at the 0.05 alpha level. This indicates that despite the variations in years of teaching experience among teacher-respondents, there is no significant difference in how they perceive the level of teaching engagement in the Division of Sulu.

The findings suggest that teachers with 16 or more years of experience do not necessarily have a better or different perception of teaching engagement compared to those with 5 years or fewer, 6-10 years, or 11-15 years of experience. In other words, the number of years a teacher has been in service does not appear to significantly influence their assessment of teaching engagement.

Therefore, it can be inferred that elementary school teachers in the Division of Sulu, regardless of their years of service, generally have similar perceptions of teaching engagement. This leads to the conclusion that the length of service does not significantly impact how teacher-respondents perceive the level of teaching engagement. Consequently, the hypothesis stating, “There is no significant difference in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to length of service,” is accepted.

Table 5.3 Differences in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to length of service.

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Vigor in Teaching	Between Groups	.263	3	.088	.346	.792	Not Significant
	Within Groups	49.706	196	.254			
	Total	49.969	199				
Dedication in Teaching	Between Groups	1.248	3	.416	1.463	.226	Not Significant
	Within Groups	55.715	196	.284			
	Total	56.963	199				
Absorption in Teaching	Between Groups	6.059	3	2.020	3.151*	.026	Significant
	Within Groups	125.647	196	.641			
	Total	131.706	199				

5.4 According to Educational Attainment

Table 5.4 this section examines the variation in teaching engagement levels among elementary school teachers in the Division of Sulu based on their educational attainment. The data shows that all sub-domains of teaching engagement, except for "Absorption in Teaching," do not exhibit statistically significant differences at the 0.05 alpha level. This suggests that, in general, teachers with different educational qualifications perceive their teaching engagement in similar ways.

The results imply that a teacher holding a doctoral degree does not necessarily assess their engagement in teaching any differently from those with a bachelor's degree, a bachelor's degree with master's units, a full master's degree, or a master's degree with doctoral coursework. Essentially, educational attainment does not appear to have a major impact on how teachers in the Division of Sulu engage with their teaching practices.

Therefore, it can be inferred that regardless of their academic qualifications, teachers in the Division of Sulu demonstrate comparable levels of teaching engagement. In conclusion, the findings suggest that educational attainment does not significantly influence how these educators perceive their teaching engagement. Consequently, the null hypothesis "There is no significant difference in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to educational attainment" is accepted.

Table 5.4 Differences in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to educational attainment

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Vigor in Teaching	Between Groups	.730	4	.183	.723	.577	Not Significant
	Within Groups	49.239	195	.253			
	Total	49.969	199				
Dedication in Teaching	Between Groups	2.492	4	.623	2.230	.067	Not Significant
	Within Groups	54.472	195	.279			
	Total	56.963	199				
Absorption in Teaching	Between Groups	10.214	4	2.553	4.098	.003	Significant
	Within Groups	121.493	195	.623			
	Total	131.706	199				

*Significant at alpha .05

5.5 According to Civil Status

Table 5.5 This section discusses the variations in teaching engagement levels among elementary school teachers in the Division of Sulu based on their civil status. The data presented shows that the F-values and corresponding p-values for each dimension of teaching engagement are statistically non-significant at the 0.05 level. This suggests that civil status does not have a meaningful impact on how teachers perceive or experience their engagement in teaching.

The results indicate that a teacher's marital status whether single, married, separated, or widowed does not significantly influence their views or experience of teaching engagement. All groups, regardless of their civil status, appear to share similar perceptions regarding their involvement in teaching-related activities.

Given these findings, it can be concluded that civil status does not play a significant role in shaping the teaching engagement of elementary school teachers in the Division of Sulu. Therefore, the null hypothesis stating that "There is no significant difference in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to civil status" is upheld.

Table 5.5 Differences in the level of teaching engagement of elementary school teachers at the Division of Sulu when data are categorized according to civil status

SOURCES OF VARIATION		Sum of Squares	df	Mean Square	F	Sig.	Description
Vigor in Teaching	Between Groups	1.050	2	.525	2.114	.123	Not Significant
	Within Groups	48.919	197	.248			
	Total	49.969	199				
Dedication in Teaching	Between Groups	.170	2	.085	.294	.745	Not Significant
	Within Groups	56.793	197	.288			
	Total	56.963	199				
Absorption in Teaching	Between Groups	.239	2	.120	.179	.836	Not Significant
	Within Groups	131.467	197	.667			
	Total	131.706	199				

*Significant at alpha .05

6. Is there a significant correlation between the level of professional skills and teaching engagement of elementary school teachers at the Division of Sulu.

Table 6 this section illustrates the correlation between the level of professional skills and teaching engagement of elementary school teachers at the Division of Sulu. Specifically, the correlation between these two variables can be described as follows:

Moderate Positive Correlation: The analysis shows a moderate positive correlation between the level of professional skills and teaching engagement. This indicates that teacher-respondents who generally perceived the level of professional skills of elementary school teachers at the Division of Sulu as "High Level" are likely to also perceive their level of teaching engagement as "Moderate Level."

This suggests that, overall, there is a moderate correlation between the level of professional skills and teaching engagement among elementary school teachers at the Division of Sulu.

Therefore, the hypothesis stating, "There is no significant correlation between the level of professional skills and teaching engagement of elementary school teachers at the Division of Sulu" is rejected.

Table 6. Correlation between the extent of professional skills and work ethics of secondary school teachers at Ministry of Basic, Higher, and Technical Education (MBHTE)–Sulu

Variables		Pearson *r*	Sig	N	Description
Dependent	Independent				
Professional Skills	Work Ethics	.382	.000	200	Moderate

*Correlation Coefficient is significant at alpha .05

Correlation Coefficient Scales Adopted from Hopkins, Will (2002):

0.0-0.1=Nearly Zero; 0.1-0.30=Low; .3-0.5 0=Moderate; .5-0.7-0=High; .7-0.9= Very High; 0.9-1=Nearly Perfect

Conclusion

This study reveals that the majority of junior high school students at Parang National High School – Main Campus are aged between 13 and 14 years, with a higher proportion of

female students, and are fairly distributed across different grade levels. The students predominantly come from households where the parents have attained up to a high school education, with a smaller percentage having completed college or postgraduate degrees. This demographic pattern suggests that while the students fall within the expected age range for their education level, their families might offer different degrees of academic support. According to Siraj-Blatchford (2010), the educational background of parents plays a vital role in shaping students' motivation and academic success, which can influence their learning outcomes, especially in subjects like Mathematics, in the context of a flipped classroom approach.

The study found that the flipped classroom method is generally regarded as an effective learning technique by the students, particularly in helping them grasp new mathematical concepts, interact with video lessons, and improve their self-learning abilities. This finding is consistent with the research of Bergmann and Sams (2021), which highlights that flipped learning enhances student engagement by enabling them to learn at their own pace, making the best use of in-class time for active learning. Despite appreciating the flexibility and the structured learning that video lessons offer, some students still favor traditional classroom instruction, suggesting that a hybrid model combining flipped and conventional teaching methods may lead to the best outcomes.

The research also identified significant differences in how students engage with the flipped classroom based on their age and grade level, while no notable differences were found according to gender or parental education level. Older students exhibited higher levels of engagement in video-based learning and independent study, which aligns with Piaget's cognitive development theory (1952), which states that as students mature, they develop greater independence and critical thinking abilities. Additionally, the results showed that younger students might need additional guidance to adapt to the flipped learning format. The lack of significant differences based on gender and parental education implies that the flipped classroom approach offers equitable learning opportunities for all students, regardless of their background, emphasizing the importance of thoughtful instructional design to ensure fair educational experiences (Hew & Lo, 2018).

Lastly, the study found strong correlations between learning new mathematical concepts, engaging with video lessons, and fostering independent learning, confirming that these factors are interconnected. These findings support the work of Lo, Hew, and Chen (2017), who argue that flipped learning, especially through video-based content, promotes deeper understanding and self-directed learning. Given the statistically significant relationships among these elements, the study highlights the critical role of well-organized video materials and interactive classroom activities in enhancing the overall effectiveness of the flipped classroom model.

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