

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

Rian Pano Tanduyan

Master of Arts in Education Major in Mathematics at the University of Perpetual Help System DALTA, Las Piñas City, Philippines

ABSTRACT: Technology has become an essential asset in modern classrooms, especially for middle school students enrolled in English and Mini English programs who are also bilingual at home. It offers interactive learning platforms, language support tools, and engaging educational resources that help students grasp complex math concepts and improve their English skills more effectively. By leveraging technology, teachers can personalize instruction, foster greater engagement, and support students' language development, ultimately enhancing their overall learning experience in a multilingual environment. Ruben Puentedura's SAMR methodology helps instructors review and improve their usage of digital resources to assist pupils integrate technology. Instead of replacing conventional techniques with technology, it supports Augmentation, Modification, and Redefinition, which makes learning more participatory, collaborative, and innovative. This paradigm helps teachers design classes that utilize technology and improve student involvement, critical thinking, and knowledge, creating more meaningful and successful learning environments. This study examines how technology integration affects middle school English Program students' math understanding, engagement, and performance, providing insights into bilingual educational strategies to improve learning outcomes. The 90 students enrolled in the Mini-English program completed the researcher-made survey, which was used to assess their attitudes, perceptions, or experiences with technology integration, and the study aimed to determine its relationship with their mathematics performance to understand how technology use might influence their academic achievement in math. The study found that young adolescent students, mostly female, who engaged with technology daily, showed that moderate technology integration positively influenced their motivation to improve in mathematical tasks, with students' age significantly affecting their use of the SAMR model. Student achievement is strongly correlated with math technology integration, demonstrating the benefits of technology. The study suggests that teachers actively use technology to create engaging, dynamic, and individualized learning experiences that accommodate varied learning styles, increase cooperation, and improve subject understanding.

KEYWORDS: Correlational Study, SAMR Model, Math Performance, Mini-English Programs, Middle School Learners

I. INTRODUCTION

In today's schools, technology is very important for students to learn. This is especially useful for middle schoolers learning arithmetic in English and Mini English while speaking another language at home. Bilingual children find it hard to master math since they have to grasp both languages and math. Digital platforms that are personalized, interactive, and visually interesting have changed the way teachers educate and improved student learning by making it easier for people with different learning styles and language barriers to study.

The SAMR technique by Ruben Puentedura helps teachers understand and use technology in the classroom. It breaks down how people use technology into four levels of difficulty and problem-solving: substitution, augmentation, modification, and redefinition. At first, teachers focus on turning worksheets and lectures into digital files. But for more advanced changes and redefinitions, you need to rethink learning objectives and allow behaviors that would be impossible without technology. Some of these are worldwide digital communication, working together to make media, and real, immersive learning. Terada (2020) thinks that integrating technology is not a hard step toward redefining education; instead, it is about picking the correct level or combination of technology to help students learn and stay interested in the course.

Patel (2024) shown that instructional applications and interactive software enhance students' engagement and interest in mathematics classes. As students get more involved, their ability to solve problems and understand things improves. Tech integration helps children do better in school by letting them learn at their own pace and giving them quick feedback. The report says that teachers can make technology integration better by using technology well in their teaching and giving students the help they need.

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

Serin (2023) also said that math instruction has changed because of new technology. Technology has been utilized a lot to make math lessons better. Collaborative areas and virtual simulations make math training more interesting, welcoming, enjoyable, and tailored to each student. These technologies are very good at improving education. These tech tools can help kids learn math.

As part of Vietnam's digital educational transformation, Puglisi (2025) said that the government worked with public telecom companies to make it easier for people in remote areas to connect to the internet. Companies have built learning apps and platforms that use AI to teach kids, parents, and schools about math, history, and money. Closing the language gap has given young people, especially girls and Indigenous people in remote places, more authority. Vietnam's digital transformation offers promise, even though it faces challenges. Vietnamese pupils who were able to use technology did better on assessments than their counterparts.

Chevacharoen (2023) demonstrated that technology enhanced student performance in Thailand. Students from low-income families and those who didn't know how to utilize technology well did better when it was used in the classroom, for homework, and for learning. Thailand's O-NET scores suggest that 6th and 12th graders do better when they use the internet and technology.

This study explored the significant impact of technology integration in math classes on bilingual middle school English students' arithmetic achievement. This study analyzes whether technology helps these kids stay motivated and succeed in arithmetic. Understanding this can help educators find better ways to teach bilingual students Mathematics using digital resources, creating a more inclusive and successful educational environment that prepares them for a tech-driven future.

II. RESEARCH QUESTIONS

1. What is the demographic profile of the respondents in terms of age, sex, grade level and length of exposure to technology?
2. What is the extent of technology integration experienced by students during mathematics instruction in terms of substitution, augmentation, modification, and redefinition?
3. What is the level of mathematics achievement of the students as measured by in their first term assessment score?
4. Is there a significant difference in the extent of technology integration experienced by students during mathematics instruction when group according to the respondents' profile?
5. Is there a significant relationship between the extent of technology integration and students' mathematics achievement?
6. Based on the findings, what intervention plan may be proposed to improve the integration of technology in mathematics instruction within the Mini English Program?

III. RESEARCH METHOD

Research Design & Sampling

This study utilized a quantitative descriptive-correlational research design to examine relationships between technology integration levels and academic achievement without experimental manipulation. The study population comprised all middle school students enrolled in the Mini English Program at Kalasinpittayasan School, Kalasin Province, Thailand, for Academic Year 2025–2026. Total enumeration sampling was employed, involving $N = 90$ students (30 students each in Grade 7/M.1, Grade 8/M.2, and Grade 9/M.3, aged 11 to 15 years). This eliminated sampling bias and provided a complete representation of the cohort.

Instrumentation & Reliability

Data collection utilized a researcher-developed, expert-validated 3-part instrument:

Part 1 gathered student demographic data.

Part 2 assessed technology integration across 28 items (7 per SAMR dimension) using a 4-point Likert Scale (4 = Great Extent [3.50–4.00], 3 = Moderate Extent [2.50–3.49], 2 = Slight Extent [1.50–2.49], 1 = Least Extent [1.00–1.49]).

Part 3 recorded official First Term academic achievement in Mathematics 7–9 (categorized per the Thai Basic Education Core Curriculum B.E. 2561).

The instrument was validated by three doctoral and institutional experts. Pilot testing with 10 non-sample students yielded excellent internal consistency via Cronbach's alpha: Substitution ($\alpha = 0.875$), Augmentation ($\alpha = 0.882$), Modification ($\alpha = 0.883$), and Redefinition ($\alpha = 0.896$).

Statistical Treatment

Data were processed using statistical software (MS Excel / SPSS / Jamovi) at $\alpha = 0.05$:

Descriptive Statistics: Frequencies, percentages, weighted means, and standard deviations.

Inferential Statistics: Independent t-tests and One-Way Analysis of Variance (ANOVA / F-test) with Tukey's post-hoc tests to evaluate demographic differences; Pearson product-moment correlation coefficient (Pearson r) to assess relationships.

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

IV. RESULTS AND DISCUSSION

This chapter gives a full picture of the data that was collected, including tables, in-depth analysis of each problem statement, and the main conclusions drawn from the data to help make smart decisions.

Tables 1, 2, 3, and 4 present the demographic profile of the respondents in terms of age, sex, grade level, and length of exposure to technology.

Table 1. Profile of the Students in terms of Age

Age	frequency	percentage
12	15	17
13	37	41
14	23	25
15	15	17
Total	90	100

Most students in the sample are 13 years old (41%). Students aged 12 and 15 each represent 17% of the group, while 14-year-olds make up 14%. This shows that the sample is largely composed of early teenagers, with 13-year-olds forming the largest age group.

Table 2. Profile of the Students in terms of Sex

Sex	frequency	percentage
Male	28	31
Female	62	69
Total	90	100

Table 2 indicates that the mini-English program enrolled 28 male students, accounting for 31%, and 62 female students, representing 69%, highlighting a higher female participation in the program.

Table 3. Profile of the Students in terms of Grade Level

Grade Level	frequency	percentage
Grade 7	30	33.3
Grade 8	30	33.3
Grade 9	30	33.3
Total	90	100

Table 3 shows that each grade level has 30 students enrolled in the mini-English program, representing 33.3% of the total, indicating an equal distribution of students across all grade levels.

Table 4. Profile of the Students in terms of Length of Exposure to Technology

Length of Exposure to Technology (hours)	frequency	percentage
1 – 2	8	9
3 – 4	26	29
5 – 6	27	30
7 – 8	29	32
Total	90	100

The data show that most students use technology for more than 4 hours each day. Specifically, 9% use it for 1–2 hours, 29% for 3–4 hours, 30% for 5–6 hours, and 32% for 7–8 hours, indicating generally high daily technology exposure among the students.

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

Table 5. Extent of Technology Integration Experienced by Students during Mathematics Instruction in Terms of Substitution

Indicators	Weighted Mean	Standard Deviation	Verbal Interpretation
1. I use technology as a direct substitute for traditional math learning tools without any functional change.	2.97	0.48	Integrated to a Moderate Extent
2. Technology replaces traditional math exercises without modifying the nature of the tasks.	2.98	0.69	Integrated to a Moderate Extent
3. I complete math assignments using digital tools without altering the original activity.	2.81	0.70	Integrated to a Moderate Extent
4. My learning process is the same, just done using electronic devices instead of paper.	3.03	0.76	Integrated to a Moderate Extent
5. Technology changes how I learn math, but the core concepts remain unchanged.	3.01	0.69	Integrated to a Moderate Extent
6. I use digital tools to perform the same math tasks I would normally do by hand.	2.97	0.57	Integrated to a Moderate Extent
7. Technology serves only as a replacement tool without enhancing my understanding of math concepts.	2.72	0.85	Integrated to a Moderate Extent
Overall Weighted Mean	2.93	0.69	Integrated to a Moderate Extent

Note: 3.50 – 4.00 = Integrated to a Great Extent; 2.50 – 3.49 = Integrated to a Moderate Extent; 1.50 – 2.49 = Integrated to a Slight Extent; 1.00 – 1.49 = Integrated to a Least Extent

Students perceive technology integration at the substitution level as a moderate replacement of traditional methods that leaves core mathematical concepts unchanged ($M = 3.01$, $SD = 0.69$). While digital tasks mirror standard exercises without altering their fundamental nature ($M = 2.98$, $SD = 0.69$), lower-rated items highlight that tool replacement rarely deepens understanding ($M = 2.72$, $SD = 0.85$) or transforms learning activities ($M = 2.81$, $SD = 0.70$). Overall, although technology is actively incorporated into assignments, students do not strongly connect basic tool substitution with significant conceptual growth, revealing clear opportunities to elevate pedagogical integration toward more transformative practices in mathematics education.

Table 6. Extent of Technology Integration Experienced by Students during Mathematics Instruction in Terms of Augmentation

Indicators	Weighted Mean	Standard Deviation	Verbal Interpretation
1. Technology helps me perform math tasks more efficiently.	3.13	0.69	Integrated to a Moderate Extent
2. Using software or apps improves my ability to solve math problems faster.	3.07	0.73	Integrated to a Moderate Extent
3. Digital tools provide additional features that make math tasks easier to complete.	3.19	0.49	Integrated to a Moderate Extent
4. I use calculators and apps that help me check my work more accurately.	3.14	0.79	Integrated to a Moderate Extent
5. Technology enhances my understanding of math concepts by providing instant feedback.	2.98	0.70	Integrated to a Moderate Extent
6. Technology allows me to explore multiple methods to solve math problems more quickly.	3.10	0.82	Integrated to a Moderate Extent
7. Using digital tools in math class improves my confidence in completing assignments accurately.	3.06	0.66	Integrated to a Moderate Extent
Overall Weighted Mean	3.10	0.70	Integrated to a Moderate Extent

Note: 3.50 – 4.00 = Integrated to a Great Extent; 2.50 – 3.49 = Integrated to a Moderate Extent; 1.50 – 2.49 = Integrated to a Slight Extent; 1.00 – 1.49 = Integrated to a Least Extent

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

Students perceive technology integration at the augmentation level to a moderate extent, valuing digital tools primarily for improving task simplicity, precision, and efficiency. The highest-rated items highlight the usefulness of supplementary features in streamlining tasks ($M = 3.19$, $SD = 0.49$), aiding calculation verification ($M = 3.14$, $SD = 0.79$), and enhancing execution speed ($M = 3.13$, $SD = 0.69$). Conversely, lower ratings for instant feedback ($M = 2.98$, $SD = 0.70$) and confidence-building ($M = 3.06$, $SD = 0.66$) indicate that students see limited impact on immediate conceptual understanding and self-efficacy. Overall, educators have clear opportunities to better leverage interactive feedback features to strengthen student confidence and mathematical learning.

Table 7. Extent of Technology Integration Experienced by Students during Mathematics Instruction in Terms of Modification

Indicators	Weighted Mean	Standard Deviation	Verbal Interpretation
1. Technology allows me to modify and redesign math tasks for better understanding.	3.02	0.69	Integrated to a Moderate Extent
2. I use interactive tools that let me explore math concepts in new ways.	3.00	0.62	Integrated to a Moderate Extent
3. I create presentations or projects using technology that change the way I demonstrate math knowledge.	3.01	0.61	Integrated to a Moderate Extent
4. Technology enables me to experiment with different problem-solving strategies in math.	3.09	0.59	Integrated to a Moderate Extent
5. I use simulations or virtual labs to investigate mathematical ideas more deeply.	2.94	0.64	Integrated to a Moderate Extent
6. Technology helps me customize math assignments to suit my learning style.	3.07	0.58	Integrated to a Moderate Extent
7. I use digital platforms to collaborate with classmates, enhancing how I approach math problems.	3.07	0.61	Integrated to a Moderate Extent
Overall Weighted Mean	3.03	0.62	Integrated to a Moderate Extent

Note: 3.50 – 4.00 = Integrated to a Great Extent; 2.50 – 3.49 = Integrated to a Moderate Extent; 1.50 – 2.49 = Integrated to a Slight Extent; 1.00 – 1.49 = Integrated to a Least Extent

Technology integration at the modification level was moderately realized ($M = 3.03$, $SD = 0.62$), fostering an interactive environment that supports diverse learning styles. Students valued technology most for experimenting with various problem-solving strategies ($M = 3.09$, $SD = 0.59$), alongside personalizing assignments and collaborating with peers ($M = 3.07$ each). Conversely, lower ratings for virtual labs/simulations ($M = 2.94$, $SD = 0.64$) and innovative interactive tools ($M = 3.00$, $SD = 0.62$) suggest students engage less with advanced exploratory resources. Overall, while basic task redesign aids customization and collaboration, targeted training on virtual simulations could better unlock deeper conceptual mathematical discovery.

Table 8. Extent of Technology Integration Experienced by Students during Mathematics Instruction in Terms of Redefinition

Indicators	Weighted Mean	Standard Deviation	Verbal Interpretation
1. Technology enables me to create or perform math tasks that were not possible before.	3.00	0.67	Integrated to a Moderate Extent
2. I use technology to collaborate with others to solve complex math problems.	2.98	0.65	Integrated to a Moderate Extent
3. I design original math projects that incorporate multimedia and digital tools.	3.02	0.60	Integrated to a Moderate Extent

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

4. Technology allows me to participate in math-related activities beyond the classroom, such as online competitions.	3.00	0.69	Integrated to a Moderate Extent
5. I use digital platforms to communicate and receive feedback from a global community on math problems.	2.99	0.71	Integrated to a Moderate Extent
6. Technology empowers me to develop innovative math solutions using advanced digital tools.	2.94	0.59	Integrated to a Moderate Extent
7. I engage in math explorations that integrate multiple technologies to create unique learning experiences.	2.91	0.63	Integrated to a Moderate Extent
Overall Weighted Mean	2.98	0.65	Integrated to a Moderate Extent

Note: 3.50 – 4.00 = Integrated to a Great Extent; 2.50 – 3.49 = Integrated to a Moderate Extent; 1.50 – 2.49 = Integrated to a Slight Extent; 1.00 – 1.49 = Integrated to a Least Extent

Table 8 demonstrates that all items were rated as "Integrated to a Moderate Extent," with the highest ratings observed for the items "I design original math projects that incorporate multimedia and digital tools" (mean = 3.02, SD = 0.60), "Technology enables me to create or perform math tasks that were previously unfeasible" (mean = 3.00, SD = 0.67), and "Technology allows me to engage in math-related activities beyond the classroom, such as online competitions" (mean = 3.00, SD = 0.69). These findings suggest a moderate level of integration of digital tools within math instruction.

Conversely, the two lowest-ranked items were "engage in math explorations that integrate multiple technologies to create unique learning experiences" (mean = 2.91, SD = 0.63) and "Technology empowers me to develop innovative math solutions using advanced digital tools" (mean = 2.94, SD = 0.59). This suggests that, although digital integration in mathematics education is moderate overall, there is comparatively less emphasis or confidence in employing multiple technologies to craft distinctive experiences and to develop innovative solutions.

The weighted mean of 2.98 and standard deviation of 0.65 indicate moderate integration of technology at the redefinition stage, indicating that most students are proficiently using applications that use multimedia to deepen their mathematical understanding. This integration not only enhances learning outcomes but also enables students to reach their full potential and actively engage in a variety of online mathematics competitions, thereby enriching their educational experiences and encouraging interaction with digital tools in the learning process.

Table 9. Academic Achievement of the Students in Mathematics

Font System	Percentage System	Frequency	Percentage	Interpretation	Mean
A	80 – 100	41	46	Excellent	Mean of the first term assessment score is 81.7
B+	75 – 79	29	32	Good	
B	70 – 74	18	20	Good	
C+	65 – 69	2	2	Good	
Total		90	100		

Note: Guidelines for Measuring and Evaluating Learning Outcomes According to the Basic Education Core Curriculum, Buddhist Era 2561 (2018)

Based on the data presented in Table 9, among 90 middle school students, 46% (41 students) achieved grades ranging from 80 to 100, classified as Excellent. Additionally, 32% (29 students) scored between 75 and 79, 20% (18 students) between 70 and 74, and 2% (2 students) between 65 and 69, all of which are categorized as Good. The statement indicates that a substantial proportion of students excelled in Mathematics, with 46% receiving an A, thereby emphasizing a high level of achievement and implying that the overall grading distribution favors top grades.

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

Table 10. Results of the Significant Difference in the Extent of Technology Integration Experienced by Students as to Substitution when Grouped According to Student's Profile

Substitution	t/F-Value	P-value	Decision	Interpretation
Age	2.86	0.04	Reject Ho	Significant
Sex	1.27	0.21	Accept Ho	Not Significant
Grade Level	1.87	0.16	Accept Ho	Not Significant
Length of Exposure in Technology	1.89	0.14	Accept Ho	Not Significant

Note: $F = \text{ANOVA}/F\text{-test}$; $\alpha = 0.05$

Data from Table 10 indicated that, in terms of age, the p-value of 0.04—being within the conventional significance threshold of 0.05—leads to the rejection of the null hypothesis. This suggests a statistically significant difference in the level of technology substitution experienced by students, implying that variations in how students utilize technology for substitution tasks are unlikely to be attributable to chance alone and may be affected by factors such as age or instructional strategies.

Consequently, the p-values of 0.21, 0.16, and 0.14 for sex, grade level, and length of exposure to technology, respectively, exceeding the significance level (typically 0.05), lead to the acceptance of the null hypotheses, implying that there are no statistically significant differences in students' experiences with technology based on these variables, and these factors do not appear to influence the extent of technology integration as to substitution among students in this study.

Table 11. Tukey's Post-hoc comparisons for Substitution for Students' Age

I Group	J Group	Mean Difference (I-J)	Sig.	Decision	Interpretation
12 years old	13 years old	-0.24	0.13	Accept Ho	Not Significant
	14 years old	-0.20	0.20	Accept Ho	Not Significant
	15 years old	-0.43	0.03	Reject Ho	Significant
13 years old	14 years old	0.04	0.59	Accept Ho	Not Significant
	15 years old	-0.20	0.21	Accept Ho	Not Significant
14 years old	15 years old	-0.24	0.12	Accept Ho	Not Significant

The post-hoc multiple comparison results in Table 11 show that there is a big difference between 12- and 15-year-old kids when it comes to how they use technology in math class. This indicates that, as students mature, their utilization of digital tools for fundamental tasks such as substitution varies, potentially reflecting differences in technological familiarity, cognitive development, or instructional strategies tailored to distinct age groups.

Table 12. Results of the Significant Difference in the Extent of Technology Integration Experienced by Students as to Augmentation when Grouped According to Student's Profile

Augmentation	t/F-Value	P-value	Decision	Interpretation
Age	0.03	3.00	Reject Ho	Significant
Sex	0.04	0.96	Accept Ho	Not Significant
Grade Level	2.47	0.09	Accept Ho	Not Significant
Length of Exposure in Technology	4.91	0.00	Reject Ho	Significant

Note: $F = \text{ANOVA}/F\text{-test}$; $\alpha = 0.05$

The data presented in Table 12, with p-values of 0.03 for age and less than 0.00 for length of technology exposure, both below the conventional significance level of 0.05, indicate that there are statistically significant differences in the extent of technology integration as to augmentation among students when grouped according to age and length of technology exposure. This suggests that students' experiences of technology integration during augmentation activities differ according to their age and length of exposure to technology. Thus, these factors may need to be considered when designing technology integration strategies in mathematics education. In contrast, the p-values of 0.96 for sex and 0.09 for grade level are greater than the 0.05 level of significance. Therefore, the null hypotheses are not rejected, indicating that there are no statistically significant differences in the extent of technology integration as to augmentation when students are grouped according to sex and grade level. Overall, the findings suggest that age and length of technology exposure are associated with significant differences in students' experiences of technology integration during augmentation, whereas sex and grade level are not.

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

Table 13. Tukey's Post-hoc comparisons for Augmentation for Students' Age

I Group	J Group	Mean Difference (I-J)	Sig.	Decision	Interpretation
12 years old	13 years old	-0.27	0.10	Accept Ho	Not Significant
	14 years old	-0.41	0.01	Reject Ho	Significant
	15 years old	-0.40	0.03	Reject Ho	Significant
13 years old	14 years old	-0.14	0.20	Accept Ho	Not Significant
	15 years old	-0.14	0.33	Accept Ho	Not Significant
14 years old	15 years old	0.01	0.97	Accept Ho	Not Significant

The post-hoc multiple comparison results shown in Table 13 indicate a significant difference in technology integration regarding augmentation activities in learning Mathematics between 12-year-old and 14-year-old students and 12-year-old and 15-year-old students, suggest that age may have an impact on the degree of technology integration, with older students possibly participating in these activities more or less successfully. The necessity for age-specific techniques to maximize the use of technology in educational settings is highlighted by the possibility that developmental, cognitive, or experience-related factors influence how different age groups use technology in mathematics learning.

Table 14. Tukey's Post-hoc comparisons for Augmentation for Students' Length of Exposure to Technology

I Group	J Group	Mean Difference (I-J)	Sig.	Decision	Interpretation
1 – 2	3 – 4	-0.40	0.13	Accept Ho	Not Significant
	5 – 6	-0.43	0.10	Accept Ho	Not Significant
	7 – 8	-0.64	0.02	Reject Ho	Significant
3 – 4	5 – 6	-0.03	0.78	Accept Ho	Not Significant
	7 – 8	-0.25	0.03	Reject Ho	Significant
5 – 6	7 – 8	-0.21	0.04	Reject Ho	Significant

The post-hoc multiple comparison results presented in Table 14 reveal significant differences in technology integration during augmentation activities among students exposed to different durations—specifically, 1–2 hours VS 7–8 hours, 3–4 hours VS 7–8 hours, and 5–6 hours VS 7–8 hours—indicating that greater exposure to technology is associated with substantial changes in students' engagement with technology in Mathematics learning. This indicates that extended exposure periods may improve or modify students' capacity to effectively integrate technology, underscoring the significance of optimizing exposure duration to maximize educational advantages and guide instructional strategies for technology implementation.

Table 15. Results of the Significant Difference in the Extent of Technology Integration Experienced by Students as to Modification when Grouped According to Student's Profile

Modification	t/F-Value	P-value	Decision	Interpretation
Age	2.89	0.04	Reject Ho	Significant
Sex	0.93	0.35	Accept Ho	Not Significant
Grade Level	1.73	0.18	Accept Ho	Not Significant
Length of Exposure in Technology	2.13	0.10	Accept Ho	Not Significant

Note: $F = ANOVA/F\text{-test}$; $\alpha = 0.05$

The p-value of 0.04 for students' age in Table 15 signifies a statistically significant difference in the degree of technology integration at the modification level, resulting in the rejection of the null hypothesis. This implies that students' age affects the manner in which technology is incorporated into modifications within their learning experiences, with older and younger students potentially engaging with technology in distinct ways during this phase of integration.

Furthermore, the degree of technology integration concerning modifications based on sex, grade level, and duration of exposure to technology, with p-values of 0.35, 0.18, and 0.10 respectively, exceeded the anticipated level of significance. This allows for the rejection of the null hypothesis, signifying that there are no substantial differences in the extent of integration of technology modification when classified by students' sex, grade level, and period of technology integration.

Table 16. Tukey's Post-hoc comparisons for Modification for Students' Age

I Group	J Group	Mean Difference (I-J)	Sig.	Decision	Interpretation
12 years old	13 years old	-0.26	0.05	Accept Ho	Not Significant
	14 years old	-0.25	0.07	Accept Ho	Not Significant

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

	15 years old	-0.41	0.02	Reject Ho	Significant
13 years old	14 years old	0.01	0.89	Accept Ho	Not Significant
	15 years old	-0.15	0.26	Accept Ho	Not Significant
14 years old	15 years old	-0.16	0.23	Accept Ho	Not Significant

The post-hoc multiple comparison results shown in Table 16 reveal a significant difference in technology integration for modification activities in learning Mathematics between 12-year-old and 15-year-old students, suggesting that age-related factors may influence how effectively students at these ages utilize technology for modifying their learning processes, with potential implications for tailoring instructional strategies accordingly.

Table 17. Results of the Significant Difference in the Extent of Technology Integration Experienced by Students as to Redefinition when Grouped According to Student's Profile

Redefinition	t/F-Value	P-value	Decision	Interpretation
Age	2.54	0.06	Accept Ho	Not Significant
Sex	0.02	0.98	Accept Ho	Not Significant
Grade Level	2.80	0.06	Accept Ho	Not Significant
Length of Exposure in Technology	2.37	0.08	Accept Ho	Not Significant

Note: $F = ANOVA/F\text{-test}$; $\alpha = 0.05$

The results in Table 17 revealed p-values of 0.06, 0.98, 0.06, and 0.08, for the students' age, sex, grade level, and length of exposure to technology were all beyond the hypothesized significance level. This could lead to the acceptance of the null hypothesis implying no significant difference statistically in the extent of technology integration as to redefinition when grouped according to the students' age, sex, grade level, and length of exposure to technology.

Table 18. Results of the Significant Relationship Between the Extent of Technology Integration and the Students' Level of Academic Achievement in the First Term

Variables	r-value	Interpretation	P-value	Decision	Interpretation
Substitution VS Mathematics Achievement	0.256	Weak Positive	0.015	Reject Ho	Significant
Augmentation VS Mathematics Achievement	0.262	Weak Positive	0.012	Reject Ho	Significant
Modification VS Mathematics Achievement	0.215	Weak Positive	0.042	Reject Ho	Significant
Redefinition VS Mathematics Achievement	0.227	Weak Positive	0.031	Reject Ho	Significant

Note: $r\text{-value} = \text{Pearson } r \text{ coefficient}$; $\alpha = 0.05$

Pearson correlation analysis reveals that all four technology integration dimensions under the SAMR framework—Substitution ($r = 0.256$, $p = 0.015$), Augmentation ($r = 0.262$, $p = 0.012$), Modification ($r = 0.215$, $p = 0.042$), and Redefinition ($r = 0.227$, $p = 0.031$)—demonstrate statistically significant, weak-to-modest positive associations with mathematics achievement. Because every p-value falls below the standard 0.05 significance threshold, the null hypothesis is rejected across all four levels.

Specifically, Augmentation exhibited the highest positive correlation ($r = 0.262$, $p = 0.012$), followed closely by Substitution ($r = 0.256$, $p = 0.015$), Redefinition ($r = 0.227$, $p = 0.031$), and Modification ($r = 0.215$, $p = 0.042$). Although the overall magnitude of these linear associations remains modest, the consistent statistical significance confirms that each technological approach plays a meaningful role in student academic performance. Ultimately, these empirical results indicate that incorporating digital tools across all SAMR levels—from direct tool replacement to complete task redefinition—substantially supports and correlates with mathematical learning outcomes within the school's Mini English Program.

CONCLUSIONS

In line with the summary of findings, the following conclusions were drawn.

The Impact of Technology Integration on Mathematics Achievement in Middle School Mini English Programs

1. The study on the mini-English curriculum concentrated on young adolescent pupils, predominantly female, who exhibited significant daily interaction with technology. This shows that they are good at using digital tools and that their age, gender, and level of interest in technology probably affected how they learned and how well they adapted to the program.

2. Giving students access to technology tools greatly increases their desire and interest in studying, especially in disciplines like arithmetic where these tools may make difficult work easier and help them do better.

3. The students' exceptional performance in the first term of SY 2025-2026 signifies a promising and favourable outcome for this academic period.

4. The students' age significantly influenced the level of technology integration, as demonstrated by their use of the SAMR model, with various age cohorts showing varying degrees of adoption and comprehension of technological tools, likely due to their stages of development and familiarity with online settings.

5. The strong association between technology integration in mathematics and student achievement shows how technology can improve education. Interactive software, internet materials, and digital exams improve student involvement, comprehension, and math mastery. Integrating modern technology to improve math instruction is crucial.

6. The proposed intervention technique aimed to improve mini-English math teachers' instructional skills.

ACKNOWLEDGMENT

The author expresses gratitude and sincere appreciation to the people listed below who helped him finish this noble task:

UPHSD Graduate School Faculty, Dr. Eduardo C. Zialcita, for their knowledge that has helped him greatly along the way. Together with the professors, who shaped me to be a better and more productive person. The efforts of those people in providing us with knowledgeable professors who have enriched our content knowledge and guided us to be fruitful in the field of education.

Prof. Alfred Orosco, Chairman of the Research Review Panel, together with members of the panel, Dr. Rebecca R. Amagsila and Dr. Rodil Fadri, for sharing their technical expertise for the improvement of this study.

Dr. Mark Anthony Gusto, Associate Professor I at UPHSD, his thesis adviser for the knowledge and scholarly advice given to him.

The administrators, teachers and students from Kalasinpittayasan School who served as the respondents of this study, who helped the researcher in gathering data relevant to completing this research study.

Finally, the author expresses his heartfelt gratitude to his family, for the inspiration and support.

REFERENCES

- 1) Alo, A. E. (2025). Effectiveness of integrating digital pedagogy in teaching mathematics. *Journal of Educational Technology and Pedagogy*, 12(1), 45–58.
- 2) Bright, A., Welcome, N. B., & Arthur, Y. D. (2024). The effect of using technology in teaching and learning mathematics on student's mathematics performance: The mediation effect of students' mathematics interest. *Journal of Mathematics and Science Teacher*, 4(2), em059. <https://doi.org/10.29333/mathsciteacher/14309>
- 3) Cadley, A. C. (2024). Effectively integrating technology into mathematics education and its benefits and challenges to teachers: A systematic literature review. *Cognizance Journal of Multidisciplinary Studies*, 4(12), 148–160.
- 4) Chevacharoen, P. (2023). Exploring the impact of ICT integration on student learning outcomes in Thailand: A scoping review. Thammasat University Press.
- 5) Flores, R. (2022). Evaluating technology integration using the SAMR model in secondary mathematics. *Educational Technology Research*, 15(3), 112–128.
- 6) Hanifah, U., Budayasa, I. K., & Sulaiman, R. (2025). Technology, pedagogy, and content knowledge in mathematics education: A systematic literature review. *Journal of Education and Learning (EduLearn)*, 19(1), 579–586.
- 7) McClain, A., & North, T. (2021). Effect of technology integration on middle school math proficiency: A multiple linear regression study. *International Journal of Education in Mathematics, Science, and Technology*, 9(4), 557–570.
- 8) Patel, A. (2024). Impact of technology integration on math achievement in middle school classrooms in India. *American Journal of Education and Practice*, 8(3), 1–12.
- 9) Puentedura, R. (2010). SAMR: A brief introduction. Hippasus Educational Research.
- 10) Serin, H. (2023). The integration of technological devices in mathematics education: A literature review. *International Journal of Social Sciences and Educational Studies*, 10(3), 54–59.
- 11) Terada, Y. (2020, May 4). A powerful model for understanding good tech integration. Edutopia. <https://www.edutopia.org/article/powerful-model-understanding-good-tech-integration/>
- 12) Viesca, K. M., & Joseph, N. M. (2021). A framework for improving the teaching of mathematics to bi/multilingual learners. IREM Paris Diderot.