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ADDIE-based evaluation of the Math-ReToKiss toolkit for struggling Mathematics learners

Dr. Imelda M. Flores
Batangas State University-The National Engineering University
Corresponding Author e-mail: *imelda.flores@g.batstate-u.edu.ph*

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Abstract

Aim: This study evaluates the perceived usability and effectiveness of the Math-ReToKiss Reinforcement Toolkit designed to support struggling students in Mathematics in the Modern World (MMW) using the ADDIE model. It specifically examines teachers' perceptions of usability, students' learning experiences, and the implications for improving toolkit-based instructional interventions.

Methodology: A descriptive-evaluative quantitative design anchored on the ADDIE model was employed. Data were collected from teachers and students who utilized the toolkit during the first semester of SY 2024–2025 through a 5-point Likert scale survey. Descriptive statistics were used to analyze responses on usability, engagement, clarity, and effectiveness.

Results: Findings indicate that both teachers and students perceived the Math-ReToKiss Toolkit as highly effective in reinforcing mathematical understanding, enhancing engagement, and improving confidence in problem-solving. The toolkit was also rated as user-friendly, well-structured, and adaptable to diverse learning needs, supporting differentiated instruction in mathematics education.

Conclusion: The Math-ReToKiss Reinforcement Toolkit is a viable instructional resource that enhances learning outcomes and supports effective teaching practices in mathematics. Its integration into classroom instruction, along with continuous feedback and refinement, can contribute to sustainable and scalable curriculum innovations in higher education.

Keywords: *ADDIE model, mathematics in the modern world, mathematics learners, struggling students*

INTRODUCTION

Mathematics remains one of the most challenging academic disciplines worldwide, with persistent gaps in students' conceptual understanding and problem-solving abilities. International assessments such as the Programme for International Student Assessment (PISA) reveal that many learners fail to meet minimum proficiency levels in mathematics, highlighting the need for targeted instructional interventions (OECD, 2019). Despite curricular reforms and innovative pedagogical strategies, a significant number of learners still demonstrate difficulties in understanding fundamental mathematical concepts, leading to poor performance and low self-confidence. This concern is particularly evident in the general education course Mathematics in the Modern World (MMW), which aims to promote mathematical literacy and problem-solving skills necessary for daily life and future careers. In the Philippine national context, the situation is even more critical. Data from the 2022 PISA, reveal that Filipino students scored an average of 355 points in Mathematics, which is significantly lower than the OECD average of 472. More alarmingly, approximately 80% of Filipino test-takers scored below Level 2 proficiency, indicating they struggle with even the most fundamental mathematical concepts (OECD, 2023).

This underperformance is mirrored in internal national assessments. According to a 2026 report by the Second Congressional Commission on Education (EDCOM 2), student proficiency rates in the Philippines experience a dramatic decline as learners advance, plummeting from 30% in Grade 3 to a negligible 0.47% by Grade 12 (EDCOM 2, 2026). This suggests that students entering higher education and enrolling in General Education courses like Mathematics in the Modern World (MMW) often carry a learning gap of over five years.

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Furthermore, the World Bank (2026) has highlighted a learning poverty crisis in the country, exacerbated by pandemic-related disruptions, where 91% of 10-year-olds struggle to read and understand simple texts—a foundational deficit that directly hampers their numerical and logical reasoning abilities later in university (World Bank, 2026). In response, the Department of Education (DepEd) has launched the National Learning Recovery Program (NLRP) under DepEd Order No. 013, s. 2023, which specifically targets literacy and numeracy recovery (DepEd, 2023). The development of the Math-ReToKiss toolkit aligns with these national priorities by providing a structured intervention to mitigate these cumulative learning losses at the tertiary level.

The Math-ReToKiss Reinforcement Toolkit was conceptualized as a remedial instructional material designed to address these recurring challenges in learning mathematics. Anchored on the ADDIE Model—comprising the stages of Analysis, Design, Development, Implementation, and Evaluation—the toolkit was developed to provide structured, engaging, and flexible learning experiences that align with curriculum standards. However, the mere existence of such intervention materials is not sufficient. Evaluating their usability, effectiveness, and overall impact on learning is crucial to ensure that they are pedagogically sound, practical for teachers, and beneficial for students. Hence, this study was initiated to systematically evaluate the Math-ReToKiss Toolkit in terms of its functionality and contribution to students' learning progress.

Recent studies support the necessity of evaluating mathematics reinforcement and remedial materials. For instance, Galay (2023) demonstrated that targeted home tutoring significantly improved students' mastery in mathematics under modular distance learning, highlighting the value of tailored interventions to address specific learning deficits. Similarly, Arpilleda (2021) found that the use of Strategic Intervention Materials (SIM) in mathematics enhanced students' performance and motivation, emphasizing that reinforcement tools are effective when they are contextualized and student-centered. These findings suggest that instructional materials must not only be content-rich but must also respond to learners' varying levels of understanding and engagement.

In addition, the disruptions in learning brought about by the different unforeseen event like earthquake, typhoon, flood, and pandemic among others further intensified the demand for adaptive and remedial instructional resources. Many students experienced learning loss due to the abrupt transition to remote or modular modalities, particularly in quantitative subjects like mathematics (Galay, 2023). Reinforcement toolkits such as Math-ReToKiss can play a vital role in mitigating these losses by providing structured, easy-to-follow activities that allow learners to revisit and master essential skills at their own pace. Evaluating such materials ensures that they are accessible, learner friendly, and capable of sustaining students' interest and motivation in mathematics.

Moreover, the success of any instructional material depends not only on its content but also on its usability and acceptability among teachers. Studies employing the ADDIE model, such as the development of mathematics learning materials on trigonometric ratios in Indonesia, revealed that systematic instructional design leads to valid, practical, and effective outputs as validated by experts and learners alike (Nursam et al., 2023). This underscores the importance of incorporating user feedback and expert evaluation in the refinement of teaching materials. By assessing teachers' and students' perceptions of the Math-ReToKiss Toolkit, the present study ensures that both pedagogical and usability dimensions are addressed, increasing the likelihood of successful classroom implementation and long-term sustainability.

Furthermore, evaluating the toolkit contributes to the broader discourse on differentiated instruction and inclusive education. Students' mathematical difficulties vary in nature and degree, necessitating flexible tools that can cater to diverse learning needs. As Spatioti, Kazanidis, and Pange (2022) emphasized, instructional design models like ADDIE are instrumental in ensuring that educational materials meet both cognitive and practical requirements of learners in different contexts. Evaluating the Math-ReToKiss Toolkit **t**hrough this lens ensures that it not only supports remedial instruction but also promotes inclusive learning practices

Moreover, this study can have important educational implications for mathematics instruction and student support programs. The identified struggles in learning Mathematics in the Modern World (MMW) emphasize the need for effective remedial and reinforcement interventions that address students' conceptual gaps and numeracy difficulties. The Math-ReToKiss Reinforcement Toolkit demonstrates that structured, learner-centered, and flexible instructional materials can improve students' understanding, performance, and engagement in mathematics. Guided by the ADDIE Model, the study can also highlight the value of systematic instructional design and evaluation in developing effective learning resources. Furthermore, the toolkit may support differentiated and inclusive instruction by addressing diverse learning needs, particularly among struggling learners affected by learning disruptions. This study could benefit students, who may improve their mathematical skills and confidence; teachers, who may use the toolkit as a supplementary remediation resource; academic administrators and curriculum developers, who may strengthen intervention programs and instructional policies; and future researchers, who may use the study as a basis for developing similar educational interventions.

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The present study is unique because it addresses this gap by systematically evaluating the Math-ReToKiss Toolkit through the ADDIE framework. Unlike general remedial materials, this toolkit is specifically designed based on the empirically identified struggles of MMW students, moving beyond one-size-fits-all instruction. By explicitly evaluating the toolkit's functionality and usability, this research contributes a validated model for instructional design that bridges the gap between theoretical pedagogical frameworks and practical, large-scale classroom implementation.

Review of Related Literature and Studies

Usability of Instructional Toolkits - Teachers' Perspectives

Teacher perceptions of instructional materials—often summarized as usability—are a critical determinant of adoption, fidelity, and sustainability. Usability commonly refers to clarity of instructions, alignment with curricular objectives, ease of integration into lesson sequences, preparation time, and the perceived pedagogical value of the materials (e.g., lesson scripts, worksheets, manipulatives) (Spatioti, Kazanidis, & Pange, 2022). Empirical evaluations of toolkits and authoring tools show that when teachers judge materials to be easy to implement and clearly aligned to learning outcomes, they are more likely to adopt and continue using them beyond pilot phases.

The ADDIE instructional design framework (Analysis, Design, Development, Implementation, Evaluation) is widely used to develop and refine instructional materials; studies indicate that materials developed through iterative ADDIE cycles tend to demonstrate higher practical acceptability because they incorporate expert review, field testing, and user feedback during development (Li et al., 2023; Abuhassna, 2024). In distance- and blended-learning contexts, comparative studies have found ADDIE-based development supports coherent lesson sequencing and scalability—attributes teachers report as important for classroom feasibility.

Usability concerns for teachers also include workload and fidelity supports. Research on educational toolkits indicates that teacher adoption increases when toolkits provide low-burden implementation aids (ready-to-use lesson plans, short teacher guides, example scripts, quick fidelity checklists) and when professional development accompanies rollout (Verkuyl et al., 2022; Webb, 2023). Thus, teacher perceptions of clarity and ease of use are directly tied to the toolkit's sustainable classroom application.

Effectiveness from Students' Perspectives- Engagement, Confidence, and Learning Gains

Student perceptions are both an outcome and a mediator of instructional effectiveness: when students perceive activities as engaging, understandable, and confidence-building, their motivation and persistence increase—factors that support measurable achievement gains. Contemporary reviews and meta-analyses of mathematics interventions (including structured practice, scaffolded tasks, and contextualized problem solving) report moderate to large positive effects on achievement when interventions are curriculum-aligned, provide timely feedback, and include iterative practice opportunities. Recent synthesis work and intervention studies emphasize that engagement and affective gains (e.g., self-efficacy, interest) frequently accompany cognitive improvements.

Self-efficacy—students' belief in their capacity to perform mathematical tasks—has been repeatedly identified as a crucial mediator of mathematics achievement. Studies from the last several years show that targeted interventions which produce early success experiences and scaffolded mastery contribute to higher self-efficacy and reduced math anxiety; subsequent improvements in achievement often follow (Yu, 2024; Skaalvik et al., 2020). Such affective effects are important to consider when interpreting student survey results that report high means for enjoyment, confidence, and perceived understanding.

Collaborative and active-learning structures embedded within toolkits (peer problem solving, small-group tasks, and reflective prompts) further amplify engagement and deeper processing. Systematic reviews in higher and secondary mathematics education indicate that active learning practices increase student participation and conceptual understanding, particularly when accompanied by teacher facilitation that links activities to explicit learning goals (Papageorgiou et al., 2025). This empirical base explains why toolkits that incorporate interactive and social tasks commonly receive strong student endorsement.

Enhancement and Sustainability of Toolkit-Based Interventions

Sustainability—the continued and effective use of an intervention over time—requires attention to implementation supports, institutional embedding, professional learning, and continuous evaluation. Implementation science and education research point to several evidence-based strategies that includes;

Iterative evaluation and refinement. Instructional materials developed with mechanisms for ongoing formative evaluation and iterative redesign are more resilient to contextual variation. The ADDIE model explicitly builds

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evaluation into the lifecycle, and contemporary applications demonstrate that frequent feedback loops (teacher and student) strengthen fit and relevance.

Professional development and communities of practice. Longitudinal research highlights that teacher professional learning communities (PLCs) or communities of practice (CoPs) support the sustained use of pedagogical innovations by facilitating shared strategies, troubleshooting, and localized adaptation (van den Boom-Muilenburg et al., 2023; Wang, 2025). Active Professional development linked to classroom practice (model lessons, coaching, peer observation) increases fidelity and long-term uptake.

Institutional integration and policy alignment. Embedding the toolkit into formal curriculum documents, assessment practices, or departmental planning reduces the likelihood that the resource remains optional and increases resource allocation and administrative support. System-level reviews suggest policy alignment is a critical enabler of scaling educational interventions across schools or departments.

Accessibility and Universal Design for Learning (UDL). Adapting toolkits to UDL principles—multiple means of representation, expression, and engagement—improves accessibility for diverse learners and strengthens inclusivity. Recent systematic reviews and meta-analyses find that UDL-aligned materials enhance learner outcomes and are particularly beneficial for heterogeneous classrooms.

Digital and blended adaptations. Converting toolkit elements into digital or blended formats increases accessibility and offers additional benefits such as usage analytics, individualized pathways, and ease of distribution. Integrations that preserve pedagogical intent while leveraging technology can expand impact and support data-driven refinement. Syntheses of technology integration within ADDIE report several promising practices and caution that technology must be pedagogically justified rather than tacked on.

Longitudinal monitoring and research. Lastly, sustained impact claims require longitudinal data. Studies that incorporate multiple follow-up measures and retention checks produce stronger evidence about long-term learning and transfer effects; implementers should plan for ongoing assessment to support continuous improvement and stakeholder accountability.

The reviewed literature highlights that the success of instructional toolkits depends on three interconnected factors: usability, effectiveness, and sustainability. From teachers' perspectives, toolkits are more likely to be adopted and consistently implemented when they are clear, practical, and aligned with curriculum goals. From students' perspectives, effective toolkits enhance engagement, confidence, and academic performance by providing interactive, scaffolded, and meaningful learning experiences. Finally, sustaining toolkit-based interventions requires continuous evaluation, professional support, institutional integration, and adaptable designs that respond to diverse learning needs. Overall, the literature affirms that well-designed instructional toolkits can significantly improve teaching and learning outcomes when supported by systematic implementation and ongoing refinement.

Synthesis and Research Gap

The reviewed literature and preliminary data underscore the critical need for structured instructional interventions to combat the alarming learning poverty and significant numeracy gaps observed both globally and within the Philippine educational landscape. While current research validates the efficacy of the ADDIE model in creating pedagogically sound materials and emphasizes that teacher usability and student engagement are the primary drivers of successful implementation, a distinct research gap remains. Most existing studies focus on general remedial materials or broad strategic intervention tools without addressing the specific, empirically identified conceptual struggles of tertiary students enrolled in Mathematics in the Modern World (MMW). Furthermore, while the theoretical benefits of such toolkits are well-documented, there is a scarcity of localized research that evaluates a specialized, reinforced toolkit like Math-ReToKiss through a dual-lens of functional usability for instructors and affective-cognitive impact on struggling learners in a post-pandemic recovery context. This study addresses this void by systematically validating how a tailored instructional design can bridge the gap between high-level curricular standards and the practical, remedial needs of university students facing cumulative learning losses.

Theoretical Framework

This study on the Math-ReToKiss Toolkit is grounded in four complementary frameworks that explain how learners acquire, process, and apply mathematical understanding through structured, supportive, and motivating learning environments. Constructivist Learning Theory, Cognitive Load Theory, Self-Efficacy Theory, and the ADDIE Instructional Design Model. These theories collectively guide the design and evaluation of the toolkit's usability and effectiveness for struggling students in Mathematics in the Modern World.

The Constructivist Learning Theory by Jean Piaget (1973) and Lev Vygotsky (1978) emphasizes that learners actively construct knowledge through interaction and discovery rather than passive reception. This principle informs

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the toolkit's interactive, hands-on, and exploratory design, enabling students to build mathematical concepts through meaningful engagement and real-world connections. The Cognitive Load Theory proposed by John Sweller (1988) explains how instructional materials should be designed to reduce unnecessary mental effort and enhance working memory efficiency. In this study, the theory ensures that the toolkit's activities and materials are structured, simplified, and sequenced to optimize cognitive processing among struggling learners.

The Self-Efficacy Theory by Albert Bandura (1997) posits that individuals' beliefs in their capabilities influence their motivation, effort, and performance. Applied in this study, it supports the idea that positive learning experiences, feedback, and progressive success in toolkit-based activities enhance students' confidence and persistence in learning mathematics. The ADDIE Instructional Design Model developed by Branson et al. (1975) provides a systematic framework for the toolkit's development and evaluation, encompassing the stages of Analysis, Design, Development, Implementation, and Evaluation. It ensures that the toolkit is both pedagogically sound and empirically validated for classroom use.

These theoretical and instructional frameworks justify the study's focus on usability and effectiveness, as they collectively address how the Math-ReToKiss Toolkit supports both the cognitive and affective domains of mathematics learning.

Conceptual Framework

This study is anchored on the ADDIE Model—Analysis, Design, Development, Implementation, and Evaluation—as the guiding framework for assessing the Math-ReToKiss Reinforcement Toolkit. The model provides a systematic process for evaluating instructional materials in terms of usability, effectiveness, and sustainability. This is shown in the Figure 1.

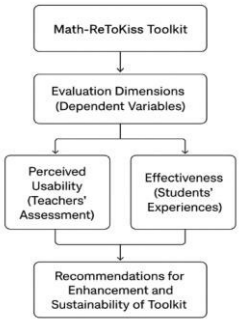

Figure 1.
ADDIE-Based Evaluation of the Math-ReToKiss Toolkit for Struggling Mathematics Learners

The Math-ReToKiss Toolkit serves as the central instructional innovation developed under the ADDIE Model. Its usability is evaluated based on teachers' perceptions of functionality, relevance, and integration potential while its effectiveness is measured through students' engagement, comprehension, and perceived learning outcomes. The insights from both dimensions lead to recommendations for the enhancement and sustainability of toolkit-based learning interventions. Mathematics remains a persistent challenge among students, particularly in general education courses such as Mathematics in the Modern World (MMW), where learners are expected to develop mathematical literacy and problem-solving skills applicable to real-life contexts. Despite the implementation of various instructional strategies and curricular reforms, many students continue to experience difficulties in understanding fundamental mathematical concepts, resulting in low academic performance, reduced confidence, and limited engagement in learning. These challenges have been further intensified by disruptions in education caused by unforeseen events such as pandemics and natural disasters, which have contributed to learning gaps and inconsistencies in instructional delivery.

To address these concerns, reinforcement tools such as the Math-ReToKiss Toolkit have been developed to provide structured, learner-centered, and flexible instructional support for struggling students. However, the effectiveness of such instructional innovations depends not only on their design but also on their usability among teachers and their impact on students' learning experiences. There remains a need to systematically evaluate whether these toolkit-based interventions are pedagogically sound, user-friendly, and capable of improving learning outcomes in mathematics.

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Thus, this study seeks to evaluate the perceived usability and effectiveness of the Math-ReToKiss Reinforcement Toolkit in supporting mathematics learning among students enrolled in Mathematics in the Modern World. Specifically, it aims to examine teachers' and students' perspectives to determine the toolkit's contribution to instructional practice, learner engagement, and academic improvement, as well as to provide recommendations for its enhancement and sustainability in educational settings.

Statement of the Problem

Mathematics remains a persistent challenge among students, particularly in general education courses such as Mathematics in the Modern World (MMW), where learners are expected to develop mathematical literacy and problem-solving skills applicable to real-life contexts. Despite the implementation of various instructional strategies and curricular reforms, many students continue to experience difficulties in understanding fundamental mathematical concepts, resulting in low academic performance, reduced confidence, and limited engagement in learning. These challenges have been further intensified by disruptions in education caused by unforeseen events such as pandemics and natural disasters, which have contributed to learning gaps and inconsistencies in instructional delivery.

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Research Objectives

General Objective:

To evaluate the perceived usability and effectiveness of the Math-ReToKiss Reinforcement Toolkit in supporting struggling students in Mathematics in the Modern World (MMW) using the ADDIE model.

Specific Objectives:

1. To assess teachers' perceptions of the usability of the Math-ReToKiss Toolkit in facilitating mathematics instruction.
2. To determine the effectiveness of the Math-ReToKiss Toolkit based on students' learning experiences, engagement, and perceived improvement in mathematical understanding.
3. To propose recommendations for the enhancement and sustainability of toolkit-based learning interventions in mathematics education.

Research Questions

1. How do teachers perceive the usability of the Math-ReToKiss Toolkit in facilitating mathematics instruction?
2. How effective is the Math-ReToKiss Toolkit in enhancing students' learning experiences, engagement, and understanding of Mathematics in the Modern World?
3. What recommendations can be proposed to improve the implementation and sustainability of toolkit-based learning interventions in mathematics education?

METHODOLOGY

Research Design

The study adopted a descriptive-evaluative quantitative research design anchored on the ADDIE Model (Analysis, Design, Development, Implementation, and Evaluation). This research design was selected because it provides an appropriate methodological framework for addressing the research objectives and systematically examining

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the variables under investigation. The descriptive component focused on identifying and describing the current status, characteristics, and responses of the participants, while the evaluative component assessed the perceived usability and effectiveness of the developed intervention through numerical data and statistical analysis. This design is appropriate as it enables the researcher to objectively measure and evaluate the phenomenon under investigation using structured research instruments (McCombes, 2023).

Population and Sampling

Data were gathered from teachers and students who utilized the toolkit during the first semester of SY 2024–2025. A sample of 288 represents the 1143 students enrolled in MMW on the aforementioned semester. The students were identified using systematic random sampling of every k-th student where k=5 from among the 1143 students who took their Mathematics in the Modern World course during the first semester of academic year 2024-2025, until the suggested number of 288 were reached while all the 10 mathematics teachers participated in the survey.

Research Instruments

The study utilized researcher-developed questionnaires to evaluate the Math-ReToKiss Reinforcement Toolkit. The first instrument assessed the toolkit's usability from a teacher's perspective, specifically measuring clarity, alignment with curriculum standards, classroom integration, and overall satisfaction. The second instrument focused on student outcomes, measuring effectiveness through learning experiences, engagement, and confidence in mathematics.

Content Validation

The study primarily focused on face and content validation, and pilot reliability testing; construct validity was only inferred through expert validation and the alignment of questionnaire items with established theoretical domains drawn from the literature. This approach is consistent with the contemporary view that validity is a unitary concept supported by multiple sources of evidence, including evidence based on test content (American Educational Research Association et al., 2014; Samuel Messick, 1995; Stephen G. Sireci, 1998).

To further ensure validity, both research instruments underwent face and content validation by the researcher and a panel of five experts composed of two Doctors of Mathematics, two Doctors of Philosophy in Mathematics Education, and one expert holding a Master of Arts in Mathematics and a Doctor of Philosophy in Educational Management. A 5-point Likert-type scale was used for the validation process, where a score of 5 indicated "Very Highly Valid" and a score of 1 indicated "Poorly Valid." The instrument obtained a mean validity rating of 4.72, which was interpreted as "Very Highly Valid," indicating excellent content adequacy, clarity, and relevance.

Reliability Testing

A pilot test involving 20 students and two mathematics teachers was conducted to evaluate internal consistency. The resulting Cronbach's alpha coefficients of .932 for the teacher instrument and .911 for the student instrument confirmed excellent reliability

Data Collection Procedure

Data were collected through Google Forms distributed to both teachers and students who participated in the implementation of the Math-ReToKiss Reinforcement Toolkit. Prior to distribution, permission was obtained from the concerned authority, and consent was sought from all participants. The data collection was done in one state university during the 2nd semester of academic year 2024-2025 for a period of one month.

Separate online questionnaires were created for teachers and students—one assessing the usability of the toolkit and the other evaluating its effectiveness. The link to each Google Form was shared via email and group chat platforms for accessibility. Participants were given clear instructions and ample time to accomplish the forms. The use of Google Forms ensured efficient data collection, minimized errors, and allowed automatic tabulation of responses for easy analysis and interpretation.

Treatment of Data

Since both questionnaires utilized a 5-point Likert scale (ranging from 1 – Strongly Disagree to 5 – Strongly Agree), this was used to interpret the results. Descriptive statistics specifically weighted mean was employed to analyze responses of teachers on the usability of the toolkits and that of the students in terms of its effectiveness enhancing students' learning experiences, engagement, and understanding of Mathematics in the Modern World.

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Ethical Considerations

This study strictly complied with ethical standards governing social science research. Letter of request to conduct the study was requested to the concerned authority. The study's objectives and procedures were clearly explained to all respondents, and informed consent was obtained to ensure voluntary participation. Respondents were assured that their privacy, confidentiality, and anonymity would be fully protected, and that no identifying information would appear in the final report. All responses gathered were securely stored and used exclusively for academic and research purposes

RESULTS and DISCUSSION

Perceived Usability of the Mathematics Reinforcement Toolkits

Table 1 presents the teachers' evaluation of the perceived usability of the Mathematics Reinforcement Toolkits (MathReToKiss). The teachers' evaluation yielded a composite mean of 4.60 (Strongly Agree), indicating that the Math-ReToKiss toolkit is not merely a supplementary material but a highly functional instructional bridge.

Table 1

Teachers' evaluation on the usability of the Mathematics Reinforcement toolkits

Indicators	Weighted Mean	Interpretation
1. The toolkit addresses the specific numeracy difficulties of students.	4.62	Strongly Agree
2. The activities are clear, structured, and easy to implement.	4.72	Strongly Agree
3. The toolkit aligns with the curriculum and learning competencies.	4.65	Strongly Agree
4. Students show improved engagement when using the toolkit.	4.67	Strongly Agree
5. The toolkit provides flexible strategies for differentiated instruction.	4.66	Strongly Agree
6. The toolkit can be easily integrated into regular classroom instruction.	4.63	Strongly Agree
7. I am confident in continuing to use the toolkit beyond the study period.	4.72	Strongly Agree
8. The toolkit provides sufficient reinforcement activities for learners with difficulties.	4.67	Strongly Agree
9. The toolkit supports the use of varied teaching strategies (e.g., visual aids, manipulatives, problem-solving tasks).	4.66	Strongly Agree
10. The toolkit contributes to improved student MMW performance based on my observations	4.70	Strongly Agree
11. The instructions for teachers are clear and easy to follow.	4.56	Strongly Agree
12. The time required to implement the activities is reasonable.	4.63	Strongly Agree
13. The materials are well-designed and appealing to learners.	4.65	Strongly Agree
14. I am likely to recommend the toolkit to other teachers.	4.72	Strongly Agree
15. Overall, I am satisfied with the effectiveness of the toolkit.	4.70	Strongly Agree
Composite Mean:	4.60	Strongly Agree

The highest ratings were consistently observed in the toolkit's clarity, ease of implementation, and potential for long-term recommendation (WM=4.72). This high level of teacher buy-in suggests that the toolkit successfully lowered the barrier to entry for instructional interventions. Often, remedial tools fail because they increase the teacher's administrative burden; however, these results indicate that Math-ReToKiss aligns with the practical realities of the classroom. The confidence in its continued use stems from the toolkit's ability to provide flexible strategies for differentiated instruction (WM=4.66), allowing teachers to address a spectrum of numeracy gaps without needing to create separate lesson plans for each student subgroup. This findings echo the research of Nursam, Hulukati, and Djakaria (2023), who argue that instructional tools developed via the ADDIE model achieve higher usability because they are grounded in iterative user feedback. Furthermore, the high rating in alignment with curriculum (WM=4.65) supports the findings of Bano et al. (2018), who noted that teacher adoption of educational technology is directly

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proportional to how well the tool mirrors institutional learning competencies rather than acting as a distraction from them. By grounding the toolkit in the MMW syllabus, the researcher avoided the supplementary fatigue often reported by educators in studies of modular learning (García-Morales et al., 2021).

In terms of its implication to educational leadership, the results provide evidence for administrators to advocate for low-friction tools. Leaders should prioritize interventions that empower teachers rather than complicate their workflows. Meanwhile, for teacher education, the high usability score suggests that Pre-service Teacher (PST) programs should incorporate toolkit-based design in their Methods of Teaching courses. If novice teachers are trained to use structured reinforcement tools like Math-ReToKiss, they are better equipped to handle diverse learner profiles from day one.

Perceived Effectiveness of Mathematics Reinforcement Toolkits

Table 2 shows the student's assessment to determine the perceived effectiveness of Mathematics Reinforcement Toolkits based on students' experiences. Students rated the toolkit's effectiveness with a composite mean of 4.54 (Strongly Agree), signaling a transformative shift in their perception of mathematics.

Table 2

Students' evaluation on the perceived effectiveness of Mathematics Reinforcement Toolkits

Indicators	Weighted Mean	Interpretation
1. The activities helped me understand math better.	4.55	Strongly Agree
2. The toolkit activities were fun and interesting.	4.60	Strongly Agree
3. I felt more confident answering math problems after using the toolkit.	4.52	Strongly Agree
4. The instructions were easy to follow.	4.50	Strongly Agree
5. I would like to use these activities again in math class.	4.55	Strongly Agree
6. I enjoyed working with my classmates during the activities.	4.55	Strongly Agree
7. The activities helped me practice solving math problems more often.	4.58	Strongly Agree
8. I felt comfortable asking questions while using the toolkit.	4.52	Strongly Agree
9. The materials (e.g., worksheets, visuals) were easy to understand.	4.50	Strongly Agree
10. The toolkit made math lessons more exciting than usual.	4.57	Strongly Agree
11. I learned new ways to solve math problems through the activities.	4.50	Strongly Agree
12. I was able to finish the activities without feeling rushed.	4.65	Strongly Agree
13. The toolkit helped me remember what I learned in previous lessons.	4.52	Strongly Agree
14. I felt proud of my work during the toolkit activities.	4.48	Strongly Agree
15. Overall, the toolkit helped me improve in math.	4.57	Strongly Agree
Composite Mean:	4.54	Strongly Agree

A critical highlight is that students felt they could finish activities without feeling rushed (WM=4.65). This indicates that the toolkit successfully mitigated Mathematics Anxiety, a psychological barrier that Ashcraft (2002) identified as a primary cause of poor performance in general education math. By providing a well-paced environment, the toolkit moved the focus from speed to mastery. These results are consistent with the Universal Design for Learning (UDL) framework (CAST, 2018), which posits that providing flexible learning pathways reduces the cognitive load on struggling learners. Furthermore, the high student engagement (WM=4.60) mirrors the work of Attard (2014), who found that mathematical proficiency is intrinsically linked to the fun factor and clarity of instructions. Unlike traditional textbooks that can be intimidating, the Math-ReToKiss toolkit acts as a scaffolded mentor, a concept supported by Vygotsky's Zone of Proximal Development.

These findings call for a shift in curriculum design toward Modular Flexibility. Reformers should consider moving away from rigid, time-bound pacing guides and toward reinforcement-rich curricula that allow for the "diverse learning speeds (WM=4.65) validated in this study. Further, Higher Education Institutions (HEIs) should develop policies that institutionalize remedial reinforcement weeks or lab-based sessions utilizing these toolkits. Policy should focus on Numeracy Wellness to improve retention rates in General Education courses.

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Recommendations for Enhancement and Sustainability of Toolkit-Based Learning Interventions

Based on the results of the study, the convergence of high scores from both teachers and students confirms that the Math-ReToKiss Toolkit satisfies both the pedagogical requirements (from the teacher's view) and the affective needs (from the student's view).

To ensure this intervention does not become a one-off study, the following analytical recommendations are made

1. Continuous Improvement through Feedback and Iterative Design
   To remain relevant, the toolkit must undergo annual reviews where student performance data are mapped against specific toolkit modules. This ensures that curriculum reform is data-driven rather than speculative.
2. Integration into the Regular Curriculum and Institutional Policy
   The positive responses from both groups suggest that the toolkit can be integrated into the regular teaching plan for Mathematics in the Modern World (MMW) and other related general education mathematics courses. Institutionalizing its use through curriculum inclusion or departmental policy will promote long-term sustainability.
3. Capacity Building and Professional Development for Teachers
   To sustain effective implementation, training and professional development workshops for mathematics educators should be conducted regularly. These sessions may focus on differentiated instruction, learner centered pedagogy, and toolkit adaptation strategies.
4. Incorporation of Digital and Interactive Components
   To further enhance accessibility and engagement, the toolkit could be digitally adapted using interactive platforms, allowing learners to access reinforcement activities anytime and anywhere. The integration of digital tools supports the blended learning approach, which combines traditional and technology-mediated learning for flexibility and inclusivity.
5. Monitoring, Research, and Impact Assessment
   Schools and higher education institutions implementing the Math-ReToKiss Toolkit should establish a long term monitoring and research system to track its impact on student performance, motivation, and retention over multiple academic terms. Conducting follow-up studies will provide empirical data to validate the toolkit's sustained effectiveness and inform evidence-based policy decisions.
6. Collaboration and Sharing of Best Practices
   Institutions are encouraged to create communities of practice where teachers can share insights, classroom experiences, and modifications of the toolkit. Collaboration fosters innovation, reduces implementation barriers, and ensures collective ownership of pedagogical tools.
7. Contextual Adaptation for Diverse Learners
   The toolkit should remain flexible to accommodate diverse learner profiles, including students with varying levels of mathematical proficiency, learning styles, and socio-cultural backgrounds. Providing differentiated versions or modular adaptations ensures inclusivity and equity in learning. In summary, the sustainability of the Math-ReToKiss Toolkit hinges on continuous evaluation, institutional integration, and teacher empowerment. Its success as a remedial and reinforcement intervention demonstrates the potential of toolkit based learning to bridge learning gaps and cultivate deeper understanding among struggling mathematics learners. With proper support, documentation, and continuous innovation, the Math-ReToKiss Toolkit can serve as a model framework for remedial and enrichment programs across other general education subjects.

Conclusions

The study establishes that the Math-ReToKiss Reinforcement Toolkit is a pedagogically sound and effective instructional resource that enhances both teaching practices and student learning outcomes in Mathematics in the Modern World. Its usability among teachers supports efficient instructional delivery, while its effectiveness among students promotes engagement, confidence, and conceptual understanding.

The findings contribute to educational research by demonstrating the value of ADDIE-based instructional design in developing practical and learner-centered teaching tools. The study also highlights the role of structured reinforcement materials in supporting differentiated instruction, curriculum enhancement, and inclusive learning practices.

Furthermore, the study provides evidence that toolkit-based interventions can serve as viable innovations in mathematics education, offering potential benefits for teachers, curriculum developers, educational leaders, and teacher education programs.

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Recommendations

1. Educational institutions may integrate the Math-ReToKiss Toolkit into regular mathematics instruction to support struggling learners and enhance classroom engagement.
2. Curriculum developers may incorporate toolkit-based instructional materials into course designs to promote structured and differentiated learning experiences.
3. School leaders and administrators may support the implementation of toolkit-based interventions through policy integration and resource allocation.
4. Teacher education programs may include training on the development and use of instructional toolkits to strengthen teachers' pedagogical competencies.
5. Educators may adopt digital and interactive adaptations of the toolkit to improve accessibility and support blended learning environments.
6. Future researchers may conduct longitudinal and experimental studies to examine the long-term impact of toolkit-based interventions on student achievement and retention

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