A Correlational Study of TikTok-based Microlearning and Metacognitive Awareness Among College Students

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Abstract

Short-form video platforms offer new possibilities for microlearning in higher education. This study examined the relationship between TikTok-based microlearning engagement and metacognitive awareness among Bachelor of Secondary Education major in Mathematics students at Biliran Province State University during the Academic Year 2025–2026. Using a descriptive-correlational quantitative design, data were collected from 81 pre-service mathematics teachers through a researcher-developed TikTok Microlearning Engagement Scale (TMES) and an adapted Metacognitive Awareness Inventory (MAI). Descriptive statistics, Shapiro–Wilk tests, and Spearman's Rank Order Correlation were applied at a 0.05 significance level. Results showed moderate engagement with TikTok-based microlearning ($M = 3.32$) and high metacognitive awareness ($M = 3.85$). Correlation analysis indicated a very weak, non-significant relationship between TMES and MAI scores ($\rho = 0.031$, $p = 0.783$), suggesting that informal engagement with short-form videos alone does not enhance students' metacognitive knowledge or regulatory skills. The findings underscore the need for structured instructional strategies and guided reflection to foster metacognitive development within digital learning contexts.

Keywords: TikTok-based microlearning, metacognitive awareness, mathematics education

1. Introduction

The rapid development of digital technologies transformed education in the 21st century. One approach that gained attention was microlearning, which delivers lessons in short and focused segments intended for quick understanding (Hug, 2005). This method suited the preferences of Generation Z learners, who are accustomed to fast information access, visually engaging content, and multitasking (Zhang et al., 2021). Microlearning was also recognized for increasing retention and promoting autonomy, as it allowed students to review content at the time they needed it most (Vacek, 2018; Han & Ellis, 2019).

Social media platforms became part of this learning environment, and TikTok is among the most popular. Its design of short, visually rich videos made it a potential tool for academic content delivery. While widely used for entertainment, TikTok became home to "EduTok" creators who share tutorials, quick study tips, and conceptual explanations in fields such as mathematics (Dwivedi et al., 2022). For many Filipino students, especially in contexts where access to traditional resources was limited, TikTok provided an accessible and low-cost supplement to formal instruction.

Parallel to these developments was the growing recognition of metacognitive awareness as an essential factor in learning success. Flavell (1979) defined metacognition as both the awareness of one's thinking and the regulation of learning strategies. It included knowledge of cognition (awareness of strategies and of oneself as a learner) and regulation of cognition, which involved planning, monitoring, and evaluating strategies. Studies such as those of Magno (2010) and Efklides (2009) highlighted that students with strong metacognitive awareness were better able to organize their learning, check for mistakes, and adjust their methods.

Although research on microlearning and research on metacognition were both well established, there was little empirical work that directly connects them in informal digital platforms like TikTok. Most existing studies focused on formal e-learning systems or mobile applications, while the academic potential of short-form, user-generated content has received limited attention. In the Philippine setting, where TikTok was widely used by college students, this gap became even more significant.

This study sought to examine the relationship between TikTok-based microlearning and metacognitive awareness among BSEd Mathematics students. By investigating how students used TikTok for mathematics-related content and how this is related to their awareness of their own learning processes, the study aimed to address the gap in the literature. The results were expected to offer insights for educators, curriculum designers, and policymakers on how short-form video platforms might be used responsibly and effectively to support students' metacognitive development.

1.1 Research Hypotheses

The research sought to examine the relationship between TikTok-based microlearning and metacognitive awareness among BSEd Mathematics students. The specific hypotheses were formulated for the interpretation of results.

H_{a1}: There is a significant relationship between TikTok-based microlearning and metacognitive awareness among BSEd Mathematics students.

H_{01}: There is no significant relationship between TikTok-based microlearning and metacognitive awareness among BSEd Mathematics students.

2. Methodology

This section of the study encompasses the design, locale, respondents, instruments used, data gathering process, statistical analysis procedures, and ethical considerations of the study.

2.1 Research Design

The research utilized a descriptive-correlational quantitative design to explore the relationship between TikTok-based microlearning and metacognitive awareness among pre-service mathematics teachers. This design is appropriate as it allowed for the examination of naturally occurring relationships between the variables without manipulation, aligning with the study's hypothesis that increased engagement with TikTok microlearning content positively correlated with higher levels of metacognitive awareness.

2.2 Study Locale and Respondents

The research was conducted in a teacher education institution located in Eastern Visayas. This locale was chosen due to its established Bachelor of Secondary Education program with a major in Mathematics, which integrates technology into its curriculum. The respondents of this study were Bachelor of Secondary Education (BSEd) Mathematics students enrolled during the Academic Year 2025–2026.

A total of 96 BSEd Mathematics students were initially identified as the target population. From this number, 15 students were selected to participate in the pilot testing of the instruments. These students were excluded from the main data collection. After the pilot test, the remaining 81 qualified BSEd Mathematics students served as the respondents of the actual study. Total enumeration was employed, ensuring full representation of the program's population and increasing the reliability of the correlational analyses.

2.3 Research Instrument

The survey questionnaire consisted of two parts: (1) informed consent and (2) the research instruments, namely the TikTok Microlearning Engagement Scale (TMES) and the adapted Metacognitive Awareness Inventory (MAI). Respondents indicated their voluntary participation through the consent section before proceeding to the instruments.

The TMES is a researcher-developed 25-item instrument with five dimensions: *Frequency of Access, Types of Content Viewed, Consistency of Engagement, Contexts of Use, and Depth of Viewing*. It was validated by experts using the Lawshe Content Validity Index (CVI = 0.82), indicating acceptable content validity. Revisions were made based on expert feedback.

The MAI, developed by Schraw and Dennison (1994), is a 52-item instrument measuring knowledge and regulation of cognition. It was adapted from a True/False format to a five-point Likert scale. The adapted version was reviewed to ensure alignment with the original constructs.

Both instruments used a five-point Likert scale. TMES responses ranged from 1 (Never) to 5 (Always), while MAI responses ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Mean scores were used to determine the levels of engagement and metacognitive awareness.

Reliability testing was conducted during pilot testing using Cronbach's alpha. The TMES obtained $\alpha = 0.89$, while the adapted MAI obtained $\alpha = 0.90$, indicating that both instruments are reliable.

2.4 Data Gathering Procedure

The data gathering process followed a structured and systematic approach. First, the researcher secured the necessary approvals from the Research Ethics Committee (REC) of Leyte Normal University to ensure that the study adhered to ethical standards. After receiving approval, the researcher submitted a formal request letter to the dean of the School of Teacher Education to obtain permission to conduct the study among BSEd Mathematics students. Once permission was granted, the researcher administered the survey through Google Forms. The form contained the informed consent section followed by the TikTok Microlearning Engagement Scale (TMES) and the adapted Metacognitive Awareness Inventory (MAI). Respondents were instructed to read the consent form carefully and indicate their voluntary agreement before proceeding with the questionnaire. Only those who confirmed their consent were allowed to continue and answer the instruments.

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Participants completed the survey at their own convenience and were informed that the activity would take approximately 20 to 30 minutes. They were also assured that there were no anticipated risks beyond minor inconvenience, such as temporary fatigue from answering the questionnaire. All responses were automatically recorded through Google Forms and stored in a secured and password-protected file accessible only to the researcher. The data collection period continued until all respondents were able to submit their completed forms.

2.5 Data Analysis

The data were analyzed using Jamovi (version 2.6) at a $p < 0.05$ level of significance. The mean and standard deviation were computed to determine the levels of TikTok-based microlearning engagement and metacognitive awareness.

The Shapiro–Wilk test was employed to assess the normality of the TMES and MAI scores. Since both variables violated the normality assumption, a non-parametric test Spearman's Rank-Order Correlation Coefficient (Spearman's Rho), was used to determine the relationship between the two variables.

2.6 Ethical Considerations

The study adhered to the ethical standards of Leyte Normal University and was conducted with approval from the Research Ethics Committee. Participation was voluntary, and informed consent was obtained prior to data collection. Respondents were informed of the study's purpose, procedures, minimal risks, benefits, and confidentiality provisions, and were allowed to withdraw at any time without penalty. All data were anonymized, securely stored, and reported only in aggregate form.

3. Results and Discussion

This section of the study presents the result, analysis of the results, and interpretation of the data collected.

3.1 Level of TikTok Microlearning Engagement

Table 1. Mean Scores and Level of Engagement for Each TMES Item

Statement	***Mean***	***SD***	***Interpretation***
1. I watch TikTok videos that explain mathematics concepts (e.g., algebraic equations, geometry lessons).	3.56	0.922	High
2. I use TikTok to review mathematics lessons after class.	2.91	1.002	Moderate
3. I watch math-related TikTok content several times a week.	3.41	0.932	High
4. I spend part of my study time watching mathematics-related TikTok videos.	2.96	0.955	Moderate
5. I revisit the same TikTok math videos more than once.	3.11	1.095	Moderate
6. I use TikTok to supplement my mathematics learning.	3.14	0.905	Moderate

7. I often encounter new mathematics TikTok videos recommended on my For You page.	3.53	1.026	High
8. I watch TikTok videos showing step-by-step math solutions.	3.62	0.982	High
9. I view TikTok tutorials on problem-solving strategies.	3.46	0.936	High
10. I watch TikTok videos that define key mathematics terms and symbols.	3.37	1.042	Moderate
11. I follow TikTok creators who specialize in teaching mathematics.	3.38	1.168	Moderate
12. I explore TikTok math videos related to my current lessons.	3.48	1.097	High
13. I view TikTok content that provides quick math tips and tricks.	3.69	0.957	High
14. I watch math TikTok videos regularly, at least three times a week.	3.44	1.037	High
15. I consistently use TikTok each week to learn different mathematics topics (e.g., algebra, geometry, statistics).	3.21	1.009	Moderate
16. Watching TikTok math content is part of my study routine.	3.07	1.070	Moderate
17. I watch TikTok math videos whenever I need to review or understand a lesson.	3.25	1.135	Moderate
18. I continue watching TikTok math videos even when not required by class.	3.33	1.072	Moderate
19. I watch TikTok math videos to help with homework.	3.48	1.050	High
20. I view math TikTok videos before tests or exams.	3.14	1.126	Moderate
21. I use TikTok to quickly learn a topic I find difficult in class.	3.36	1.052	Moderate
22. I watch TikTok math videos during my free time.	3.25	1.007	Moderate
23. I usually spend around 10 minutes or more at a time watching math TikTok videos.	3.27	1.084	Moderate
24. I usually watch multiple math TikTok videos in one sitting.	3.00	1.151	Moderate
25. I prefer watching TikTok math videos over other sources of review (e.g., books, YouTube, notes).	3.27	1.084	Moderate

As shown in Table 1, the item-level analysis of the TikTok Microlearning Engagement Scale (TMES) indicates that respondents generally reported moderate to high engagement across the 25 items. Mean scores ranged from 3.00 to 3.69, reflecting a tendency toward agreement with statements regarding the use of TikTok for mathematics learning. The highest engagement was observed in items related to Types of Content Viewed (e.g., Items 8, 12, 13) and Frequency of Access (Items 1 and 7), which were rated as high, while other items across dimensions such as Consistency of Engagement, Contexts of Use, and Depth of Viewing Frequency received moderate ratings. Standard deviations ranged from 0.905 to 1.168, suggesting moderate variability in responses across items.

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Table 2. Mean Scores and Level of Engagement Across TMES Dimensions and Overall Engagement

	Mean	*SD*	*Interpretation*
Frequency of Access	3.23	0.803	Moderate
Types of Content Viewed	3.50	0.881	High
Consistency of Engagement	3.26	0.924	Moderate
Contexts of Use	3.31	0.944	Moderate
Depth of Viewing Frequency	3.24	0.997	Moderate
TMES Overall Mean	**3.32**	**0.826**	**Moderate**

The dimension-level analysis in Table 2 illustrates that among the five TMES dimensions, Types of Content Viewed showed the highest engagement (M = 3.50, SD = 0.881, High), while Frequency of Access (M = 3.23, SD = 0.803), Consistency of Engagement (M = 3.26, SD = 0.924), Contexts of Use (M = 3.31, SD = 0.944), and Depth of Viewing Frequency (M = 3.24, SD = 0.997) reflected moderate engagement. The overall TMES mean was 3.32 (SD = 0.826), indicating moderate engagement across all dimensions. This suggests that although participants were particularly engaged with content-specific TikTok videos, their overall engagement in using TikTok for mathematics learning remained moderate.

3.3 Level of Metacognitive Awareness

Table 3. Level of Metacognitive Awareness

Statement	**Mean**	**SD**	**Interpretation**
I ask myself periodically if I am meeting my goals.	3.85	0.792	High
I consider several alternatives before I solve a problem.	3.84	0.766	High
I try to use strategies that have worked in the past.	3.99	0.887	High
I pace myself while learning in order to have enough time.	3.89	0.822	High
I understand my intellectual strengths and weaknesses.	3.94	0.899	High
I consciously focus my attention on important information.	3.96	0.858	High
I ask myself if I am taking the right approach to a problem.	3.88	0.900	High
I change strategies when I fail to understand.	3.83	0.877	High
I use different learning strategies depending on the situation.	3.99	0.915	High
I stop and reread when I get confused.	3.91	0.869	High
I think about what I really need to learn before I begin a task.	3.84	0.813	High
I summarize information in my own words.	3.41	0.787	High
I have clear goals for my learning.	3.90	0.831	High

I ask myself questions about how well I am learning.	3.75	0.814	High
I try to predict what I will need to learn.	4.16	0.981	High
I review my notes to monitor my learning.	3.69	0.944	High
I know what kind of information is most important to learn.	3.31	0.801	Moderate
I organize my study time effectively.	3.80	0.813	High
I set specific goals before I start learning.	3.88	0.927	High
I ask myself how well I am doing while learning.	3.59	0.818	High
I check my understanding during learning.	3.85	0.853	High
I ask myself questions to make sure I understand.	3.81	0.976	High
I plan my approach before beginning a task.	3.99	0.829	High
I revise my strategies if I'm not successful.	3.81	0.896	High
I monitor my comprehension as I read.	3.90	1.125	High
I adjust my study strategies if needed.	4.02	0.851	High
I look for connections among ideas.	3.91	0.809	High
I identify what I don't understand.	3.88	0.765	High
I change my approach if I am confused.	3.86	0.787	High
I make plans to solve problems before starting.	3.90	0.800	High
I use strategies that help me understand better.	3.65	0.839	High
I evaluate the effectiveness of my learning strategies.	3.58	0.804	High
I am aware of my thinking processes while learning.	3.64	0.763	High
I identify when I need help with learning.	3.90	0.846	High
I use previous knowledge to help me learn new information.	3.79	0.862	High
I notice when I am confused.	3.88	0.842	High
I plan my learning tasks in advance.	3.67	0.880	High
I check my progress toward goals.	3.80	0.828	High
I adjust my strategies based on results.	4.04	0.901	High
I monitor my comprehension and understanding.	4.02	0.866	High
I review what I have learned to ensure understanding.	3.72	0.884	High
I ask myself questions to clarify information.	4.02	0.987	High
I evaluate my learning after completing a task.	3.90	0.976	High
I reflect on how well I learned.	3.41	0.787	High
I recognize the strategies that work best for me.	3.65	0.977	High

I am aware of my cognitive strengths and weaknesses.	4.21	0.984	High
I monitor my learning continuously.	3.90	0.831	High
I adjust my learning based on self-assessment.	3.79	0.876	High
I think about why I am using a particular strategy.	3.90	0.917	High
I consider alternative ways to solve problems.	3.81	0.882	High
I evaluate my learning after reading or studying.	4.01	0.955	High
I reflect on my thinking to improve my learning.	4.19	0.910	High

As shown in Table 3, most items under the MAI were rated high, indicating that respondents frequently engaged in metacognitive behaviors such as planning, monitoring comprehension, adjusting strategies, and reflecting on learning outcomes.

Table 4. Mean Scores of Metacognitive Awareness Dimensions

	Mean	***SD***	***Interpretation***
Knowledge of Cognition	3.83	0.636	High
Regulation of Cognition	3.85	0.625	High
MAI Overall Mean	3.85	0.606	High

The dimension-level results presented in Table 4 show that respondents demonstrated a high level of Knowledge of Cognition (M = 3.83, SD = 0.636) and Regulation of Cognition (M = 3.85, SD = 0.625), resulting in an overall MAI mean of 3.85, interpreted as High.

These findings indicate that the respondents were generally aware of their learning strategies and capable of planning, monitoring, and evaluating their learning processes. This result is consistent with the work of Schraw and Dennison (1994), who reported that pre-service teachers often demonstrate strong metacognitive awareness due to frequent engagement in reflective and strategy-based academic tasks.

The results further support Flavell's (1979) theory of metacognition, which emphasizes that metacognitive awareness develops through experience and reflective learning. Similar findings were reported by Magno (2010) in the Philippine context, where education students exhibited high levels of metacognitive regulation. Moreover, Efklides (2009) and Veenman et al. (2006) highlighted that metacognitive awareness is closely associated with effective learning, particularly in cognitively demanding disciplines such as mathematics.

Overall, the results suggest that the respondents possess well-developed metacognitive skills, which may support effective learning in both formal academic settings and informal digital learning environments.

Table 5. Normality Test for TMES and MAI Scores (Shapiro–Wilk Test)

				Shapiro-Wilk	
	N	***Mean***	***SD***	***W***	***p***
TMES Overall Mean	81	3.32	0.826	0.969	0.043
MAI Overall Mean	81	3.85	0.606	0.932	<.001

Table 5 presents the Shapiro–Wilk test of normality for the overall mean scores of the TikTok Microlearning Engagement Scale (TMES) and the Metacognitive Awareness Inventory (MAI). Results show that TMES (W = 0.969, p = 0.043) and MAI (W = 0.932, p < .001) both have p-values less than 0.05, indicating that the distributions of the two variables significantly deviate from normality.

Given these findings, the assumptions for parametric correlation tests are violated. Therefore, a non-parametric correlation technique, specifically Spearman's rho, is considered more appropriate for examining the relationship between TMES and MAI.

Table 6. Correlation Between TMES and MAI (Spearman's rho)

		TMES OVERALL MEAN
MAI OVERALL MEAN	Spearman's rho	0.031
	df	79
	p-value	0.783

Table 6 presents the Spearman correlation analysis between the TikTok Microlearning Engagement Scale (TMES Overall Mean) and the Metacognitive Awareness Inventory (MAI Overall Mean). The results indicate a very weak positive correlation ($\rho = 0.031$, $p = 0.783$), which is not statistically significant at the $\alpha = .05$ level. This suggests that students' engagement with TikTok microlearning content does not have a significant relationship with their level of metacognitive awareness.

The lack of a significant correlation implies that, although learners may frequently interact with short form microlearning materials, such engagement alone may not enhance their metacognitive knowledge or regulatory processes. These findings are consistent with prior research indicating that brief, attention-focused digital content can support motivation and immediacy but does not necessarily promote deeper cognitive processing without deliberate instructional design (Guo et al., 2020; Mayer, 2019).

Summary and Conclusions

This study revealed that BSEd Mathematics students engage with TikTok microlearning at a moderate level, particularly regarding the types of mathematics content they access, suggesting that TikTok primarily functions as a supplementary learning resource rather than a primary instructional tool. The respondents also demonstrated high levels of metacognitive awareness, reflecting well-developed capacities to plan, monitor, and regulate their own learning processes. Correlation analysis, however, indicated a very weak and non-significant relationship between TikTok microlearning engagement and metacognitive awareness, implying that informal interaction with short-form content does not substantially influence students' metacognitive skills.

These findings are consistent with prior research, which suggests that while microlearning can enhance motivation and attentional engagement, it does not automatically foster deeper cognitive processing unless embedded within structured instructional frameworks. Therefore, the development of metacognitive competencies requires deliberate pedagogical strategies, including guided reflection, strategic instruction, and purposefully designed learning tasks, which short-form video platforms alone cannot provide

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