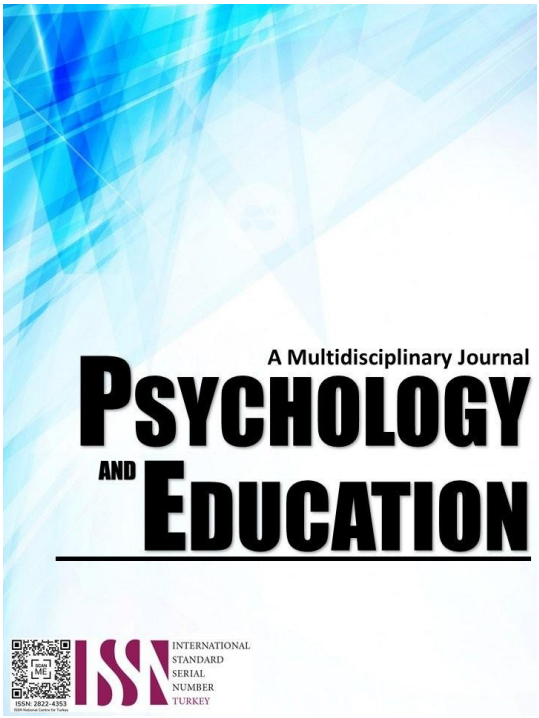
TIKTOK MATHEMATICAL VIDEOS AND PERFORMANCE IN FACTORING POLYNOMIALS OF GRADE 7 STUDENTS



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Research Article

TikTok Mathematical Videos and Performance in Factoring Polynomials of Grade 7 Students

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Abstract

TikTok is one of the most popular social media applications at present. Its videos cover a wide range of content, including academically related ones. Studying its impact on education, TikTok was examined as a tool for use in the teaching and learning process. This study aimed to assess whether TikTok has an impact on the performance of Grade 7 students in Factoring Polynomials. Concurrent embedded design, which collected both types of data simultaneously, with quantitative data as the primary focus, was employed in the study. Through the use of a comprehensive sampling technique, thirty-four (34) participants were tasked with answering the pre-test. After 20 minutes, students watched TikTok Videos about factoring polynomials on TikTok. Afterward, the post-test was administered for 20 minutes, followed by an additional 5 minutes for collecting insights on the advantages of TikTok Mathematical Videos. The gathered data were analyzed using frequency counts, percentages, means, standard deviations, the Wilcoxon Signed-Rank Test, and thematic analysis. The results showed that most students achieved a satisfactory performance after the intervention. However, it was found that there is no significant difference between the performance of Grade 7 students in Factoring Polynomials before and after the intervention. Nevertheless, TikTok Mathematical Videos provide entertainment, make learning easier, are rich in content, and facilitate faster learning based on the themes that emerge from the advantages.

Keywords: *TikTok, factoring polynomials, mathematical videos, learning process, performance*

Introduction

Over the years, there has been significant progress in the technologies that people use. One of these is the development of various social media platforms, such as TikTok, which has gained popularity recently. It provides netizens with a variety of videos, including dance, food, life hacks, and academically related topics. It has unique factors, as it consists of videos that users can post, while other users benefit from watching, sharing, liking, and commenting on the videos created by these users (Kingsbury et al., 2021).

These videos include tips and shortcuts for studying concepts such as mathematics. TikTok makes learning content more realistic and entertaining. According to Escamilla-Fajardo et al. (2021), TikTok inspires students, provides an engaging learning environment, and fosters valuable skills.

TikTok is believed to be a future educational resource because it allows for the transfer of unique learning lessons in a short period (less than 60 seconds). Using TikTok to design and deliver creative learning content can enhance instructional strategies based on nano-learning concepts, facilitating the creation of high-quality online educational content (Khlaif & Salha, 2021).

Factoring polynomials is an essential topic in mathematics that students must master (Bandala, 2023). Given its significance, a solution must be offered for challenges that many people may confront in relation to this. Thus, the researchers seek to analyze the effects of TikTok Mathematical Videos on the performance of Grade 7 students in factoring polynomials. Moreover, the participants' responses regarding the advantages of watching TikTok mathematical videos were included.

Research Questions

This study aimed to determine the effects of the TikTok Mathematical Videos on the performance of Grade 7 students of a certain school in Calabarzon in Factoring Polynomials. Specifically, the researchers seek to answer the following questions:

1. What are the scores of Grade 7 students in Factoring Polynomials before watching TikTok Mathematical Videos?
2. What are the scores of Grade 7 students in Factoring Polynomials after watching TikTok Mathematical Videos?
3. Is there a significant difference between the performance of Grade 7 students in Factoring Polynomials before and after watching TikTok Mathematical Videos?
4. What are the advantages of using TikTok Mathematical Videos in the performance of Grade 7 students in Factoring Polynomials?

Literature Review

As time passes, technology in our society has developed. Various social media platforms have been developed, which have significantly impacted the way people live and communicate. It affected people of all ages, including adults and most especially young ones.

Among the numerous social media applications available today is TikTok. Given its impact, the researchers aim to assess whether TikTok affects the academic performance of students, specifically in the field of mathematics.

TikTok Application

TikTok is one of the most popular social media apps currently trending. With a record 672 million downloads, it is considered the most widely accessed application internationally for 2022 (Curry, 2023). TikTok is popular among people of all ages, especially the young. It was found that out of 100 respondents, 79 BSIT students in South Cotabato have access to the application, while the rest don't have an account (Lictawa et al., 2022).

Through a large selection of freely viewable content, TikTok entertains its audience. The general public has access to a wide range of videos on various topics, including dancing, food, fashion, life hacks, and even academic subjects such as math.

TikTok on Education

Numerous studies have examined whether TikTok can be integrated into the teaching and learning process due to its widespread use. There are advantages and disadvantages of using TikTok in a classroom setting (Khlaif & Salha, 2021). Students' performance in class suffers when they spend more time on TikTok because it causes them to become less attentive (Mekler, 2021).

Despite the disadvantages found in some studies, the use of TikTok in learning can have some positive effects. In the study by Revesencio et al. (2022) on the use of TikTok in English learning, Western Visayas education students encountered new words. Although there was a difficulty encountered in the use of grammar, the advantages of using TikTok outweighed the disadvantages.

The study by Solomon (2021) reveals that social media platforms like TikTok and classroom curricula can complement each other to enhance student engagement. It can promote emotional health and foster academic success, as it demands the display of 21st-century skills. TikTok, as a collaborative application, helps students maximize their learning experience (Fitria, 2023) and is utilized to promote high-quality learning through microlearning (Conde-Caballero, 2023). Moreover, students pay close attention when social media is used as teaching material. The study discovered that student performance increased with the introduction of TikTok lesson interventions. Students generally felt positive about using TikTok as a teaching tool because they thought it was entertaining and interactive. In Salasac et al. (2022), TikTok was found to increase college students' engagement. TikTok instruction is favored over conventional instruction. Easy-to-use instructions and learning are what help pupils retain the material better. All things considered, learning could be more pleasurable and student engagement could be increased by using social media platforms like TikTok (Roberd & Roslan, 2022).

It was also discovered that TikTok helped pupils become more proficient in a variety of areas. According to a study on kids' oral communication skills, test results for students increased rapidly following the release of TikTok. It implies that pupils' speaking skills are improved by TikTok (Ferstephanie & Pratiwi, 2022). Eighty-eight (88%) of students concur that TikTok is a commonly used learning tool for English as a foreign language, according to Afidah et al. (2021). TikTok videos also generated considerable excitement and increased motivation among students to learn the simple present tense (Koniah et al., 2021). Students' interest in statistics and Microsoft Excel has increased as a result of the use of TikTok as a platform for bite-sized statistics training (Jacobs et al., 2022). Students who excel in arithmetic can also benefit from watching short films on platforms like this (Ding et al., 2022).

In conclusion, the use of TikTok has a great influence on students. It is an application that meets the demands and interests of the pupils when used as a teaching medium (Agting et al., 2022). To adopt the positive aspects of TikTok, establishing local and national organizations within educational institutions is essential (Khlaif & Salha, 2021).

Factoring Polynomials

Factoring polynomials is one of the most important concepts that students need to study in mathematics (Bandala, 2023). Being able to express a polynomial as a product of its factors enables pupils to apply critical thinking skills. Different polynomials correspond to different methods of obtaining their factors in their respective formats. It will be very helpful to factor in when one can differentiate between different types, such as when identifying perfect square trinomials (Bowie, 2023).

Proficiency in factoring polynomials will make it easier to understand complex ideas. For example, one can prove trigonometric identities more successfully if one has experience with factoring. Additionally, factoring polynomials can be applied to the evaluation of function limits, among other calculus principles. Given its significance, a solution must be offered for challenges that many people may confront in relation to this.

Various studies have employed different teaching strategies and techniques to improve students' performance. Villanueva et al. (2022), examine whether the X-Box Method improves the students' performance in factoring quadratic trinomials during the distance learning modality. Through experiments, it was found that both the control and experimental groups showed an improvement in their scores. However, the performance of the Grade 7 students who took the module on the X-Box method is better compared to those who took the module available at school. On the other hand, Bandala (2023) applied the method devised by ancient Indians known as Vedic Mathematics Techniques (VMT) and found, through the implementation of a quasi-experimental design and a qualitative approach, that there is an improvement in the performance of students in Factoring Polynomials after learning VMT. At the same time, some students prefer the traditional method to VMT.

Furthermore, the application of different theories and models to teach factoring polynomials has also been emphasized by other

researchers, such as Montecillo (2021), who conducted a true experiment in which the devised geometric physical models were found to have a positive effect.

Synthesis

Factoring polynomials is a concept in mathematics that holds great importance, and finding strategies to teach it with an easier approach is still on the horizon. TikTok, a social media application that has been trending lately, has been found to have a positive effect on students' performance, particularly in business statistics. Based on the existing literature, the researchers are interested in determining whether the same benefits can be obtained from students' performance in factoring polynomials.

Methodology

Research Design

The study employed a concurrent embedded design, which collected both quantitative and qualitative data simultaneously. According to George (2021), this type of research design enabled researchers to strengthen and supplement their conclusions from the primary type of research design. In this study, quantitative data became the primary focus.

As part of the quantitative approach, a pre-experimental design was employed in the study, specifically a one-group pre-test post-test study. In this type of experiment, all participants took the treatment, and there was no control group. At the initial part of the process, a pre-test was given to the respondents. It was followed by an intervention in which students were assigned to watch TikTok Mathematical Videos about Factoring Polynomials. After the treatment, a post-test was administered to see if there were any changes in the score.

Moreover, a qualitative approach was employed to gather students' insights on the advantages of watching TikTok Mathematical Videos in learning Factoring Polynomials.

Respondents

The participants in the study were 34 Grade 7 students from a specific school in Calabarzon during the 2023-2024 school year. The researchers assigned Grade 7 students as respondents to better understand whether TikTok Mathematical Videos affect the performance of students in Factoring Polynomials.

Instrument

To collect the necessary data for the study, the researchers developed their own research instrument for Factoring Polynomials. The questionnaires for the pre-test and post-test were from different sets but had the same level of difficulty. A Table of Specification (TOS) was prepared to guarantee that the 20-item test with Matching Type and Identification covered the different types of factoring polynomials: 1. polynomials with common monomial factor, 2. difference of two squares, 3. sum, and difference of two cubes, 4. perfect square trinomials, and 5. general trinomials.

To ensure the validity of the instrument, questionnaires were pilot-tested on thirty (30) Grade 7 students from another school. The result of Cronbach's alpha is 0.9 (greater than 0.7), which indicates that the instrument is reliable.

Furthermore, the researchers upon asking for permission utilized the following TikTok Mathematical Videos publicly available covering five (5) types of factoring polynomials https://vt.tiktok.com/ZSNmcneuY/, https://vt.tiktok.com/ZSNmTmx7E/, https://vt.tiktok.com/ZSNmTcQoE/, https://vt.tiktok.com/ZSNmTbpHT/, https://vt.tiktok.com/ZSNmTTxSu/, https://vt.tiktok.com/ZSNmTu2oU/ ((akositeachergononfb, 2023; chelsiedel, 2023; chermarktvph, 2022a; chermarktvph, 2022b; mathtutorialsbyprofd, 2023; sirorio27, 2023).

Procedure

As this study focused on the performance in Factoring Polynomials of Grade 7 students of a certain school in Calabarzon, the researchers submitted a letter of permission to conduct the study to the principal. Once approved, the researchers requested the consent of the subject teacher assigned to Grade 7. After ensuring that the students were allowed to participate in the study through a consent letter, the researchers proceeded with the face-to-face data collection.

The participants were allowed 20 minutes to complete the pre-test. After the allotted time was consumed, the respondents watched TikTok Mathematical Videos about Factoring Polynomials. Afterward, the post-test is distributed. The respondents were given 20 minutes to answer the test, with an additional 5 minutes for insights into the advantages of watching TikTok Mathematical Videos. The researchers ensured that the process was implemented throughout the pre-experiment.

Data Analysis

The researchers employed various statistical tools, including frequency counts, percentages, means, standard deviations, the Wilcoxon Signed-Rank Test, and thematic analysis, to analyze the collected data.

To determine the proportion of Grade 7 students' scores in the pre-test and post-test, frequency counts, percentages, means, and standard deviations were used.

To interpret the respondents' scores on the Pre-test and Post-test, the researchers adapted the table from Bandala (2023) with added interpretation.

A normality test was conducted to check the distribution of the data. The resulting p-values of the Shapiro-Wilk test for the pre-test (0.003) and post-test (0.002) are both less than 0.05. Moreover, the results from the Kolmogorov-Smirnov test were also less than 0.05. It revealed that the data is skewed and there is a need for the use of a non-parametric test.

The Wilcoxon Signed Rank Test, the counterpart of the paired t-test, was used to identify the significant difference between the performance of Grade 7 students in Factoring Polynomials before and after watching TikTok Mathematical Videos.

Furthermore, the students' responses about the advantages of using TikTok Mathematical Videos were analyzed using thematic analysis which resulted to themes that were presented in the discussion.

Ethical Considerations

In alignment with Republic Act 10173, also known as the Data Privacy Act, all data collected during data gathering will be used solely for the purpose of this study and will be kept confidential. The participants were informed that their responses would be treated confidentially and anonymously. Their participation was voluntary; thus, consent letters stating the conditions of the study were disseminated prior to the pre-experiment and the distribution of questionnaires.

Results and Discussion

The study's findings, gathered from thirty-four (34) Grade 7 students of a certain school in Calabarzon, are presented in accordance with the research questions posed.

Table 1. *Pre-test Scores of Grade 7 Students in Factoring Polynomials*

Scores	*Frequency*	*Percentage*	*Description*	*Interpretation*
0-3	10	29.4118	Very Poor	Does not know how to factor polynomials. Reviewing the topic is necessary.
4-7	9	26.4706	Poor	Limited knowledge of the topic. Improvement is required.
8-11	9	26.4706	Satisfactory	Familiar with factoring polynomials but still possible for improvements.
12-15	6	17.6471	Very Satisfactory	Have an understanding about factoring polynomials.
16-20	0	0.00	Outstanding	Knows how to factor polynomials very well.
Total	34	100		

Table 1 presents the scores of the Grade 7 students in the pre-test. Out of thirty-four (34) respondents, ten (10) individuals' scores fell within the range of 0-3, indicating that they had no prior knowledge about factoring polynomials. Nine (9) students got 4-7 scores and showed limited knowledge of the topic. There were also other nine (9) students whose scores ranged from 8-11 and displayed familiarity with factoring. On the other hand, six (6) students exhibited a very satisfactory performance as they have an understanding of the topic with their scores ranging from 12-15. There are no students who scored 16-20. The average of the students' scores is 7.0294 with a standard deviation of 4.4346.

It shows that most students obtained a very poor performance in the pre-test on factoring polynomials. The results agreed with Bandala (2023), who found that the students' performance before implementing the intervention was very poor.

Table 2. *Post-test Scores of Grade 7 Students in Factoring Polynomials*

Scores	*Frequency*	*Percentage*	*Description*	*Interpretation*
0-3	10	29.4118	Very Poor	Does not know how to factor polynomials. Reviewing the topic is necessary.
4-7	4	11.7647	Poor	Limited knowledge of the topic. Improvement is required.
8-11	11	32.3529	Satisfactory	Familiar with factoring polynomials but still possible for improvements.
12-15	9	26.4706	Very Satisfactory	Have an understanding about factoring polynomials.
16-20	0	0.00	Outstanding	Knows how to factor polynomials very well.
Total	34	100		

After the intervention, ten (10) students got scores from 0-3, indicating a very poor performance, and four (4) respondents have obtained poor performance with scores of 4-7. On the other hand, eleven (11) students achieved scores of 8-11, indicating that they have become familiar with factoring polynomials. For very satisfactory, nine (9) students received scores from 12 to 15. This revealed that the majority of the participants performed at a satisfactory level. The frequency of students who got scores of 16-20 is zero. The mean of

the scores is 7.8824, and the standard deviation is 4.7531.

The findings are in accord with Bandala (2023), as most students attained satisfactory performance in factoring polynomials after the intervention was introduced.

Table 3. *Difference between the Pre-test and Post-test Scores of Grade 7 Students using Wilcoxon Signed Rank Test*

Variables	*No. of respondents*	*Mean*	*Significance Value*	*Interpretation*
Pre-test Scores	34	7.0294	.101	Not Significant
Post-test Scores	34	7.8824		

***Level of significance at 0.05*

Table 3 presents the difference between the pre-test and post-test scores of the students in Factoring Polynomials, using the Wilcoxon Signed-Rank Test. Based on the mean, students got higher scores on the post-test compared to the pre-test (7.0294 < 7.8824). However, the difference is not significant since .101 is greater than 0.05, which is the assigned significance level. This is in contrast with the study by Roberd & Roslan (2022), where TikTok was found to have positive effects on students' performance in light energy.

The result indicates that the null hypothesis (H0) is accepted, meaning that there is no significant difference in the performance of Grade 7 students in Factoring Polynomials before and after watching TikTok Mathematical Videos.

Table 4. *Advantages of Using TikTok Mathematical Videos in the Performance in Factoring Polynomials*

Themes	*Core Ideas*
Provides entertainment	TikTok Mathematical Videos are entertaining.
	Learning through the use of TikTok Mathematical Videos makes me happy.
Makes learning easier	It helps to easily understand the concept.
	TikTok Mathematical Videos show the easiest technique to solve a problem.
Rich in content	Gaining a lot of knowledge in TikTok Mathematical Videos.
Makes learning faster	It enables students to learn faster.
	TikTok Mathematical Videos assist in learning in a short time.

Table 4 presents the advantages of using TikTok Mathematical Videos in the performance of factoring polynomials. Based on thirty-four (34) responses, four (4) themes have emerged: 1. provides entertainment, 2. makes learning easier, 3. rich in content, and 4. makes learning faster.

The core ideas from the first theme, including the core idea that TikTok Mathematical Videos is entertaining according to student no. 1.

"it's very funny..."

It was also found that TikTok makes students happy, as indicated by student no. 30.

"My benefit in watching a TikTok mathematical video was learning and knowing what we going to next topic will be and I'm happy to learn it."

In TikTok, learning is made easier by helping students understand concepts based on their responses, as seen in students 1, 2, 9, 16, 23, and 29.

"*...and I can understand my math easily..."*

"...we can answer it easily and we understand it easily..."

"...they make the problem easier and simpler..."

"I learn about how to solve easily..."

"...you can understand math further and more easily by just watching video tutorials..."

"...it helps you solve more easily...".

Students 5, 10, 12, and 29 say that it shows the easiest technique to solve a problem.

"...TikTok share their technique or the easiest technique you can apply to answering algebra or any mathematical equation."

"We can learn more techniques for answering math problems."

"...The video shows the simpler ways to go through solving polynomials in short or basic terms."

"...knowing more easy ways of solving helps a lot..."

The students have gained a lot of knowledge from TikTok Mathematical Videos, indicating that it's rich in content. Responses from students no. 1, 24, 25, 26, and 28 are as follows.

"...It's helping us learn so much."

"The benefit of watching TikTok mathematical videos is we can learn a lot about our topic..."

"...we can have a lot more information..."

"It was very helpful because I learned a lot..."

"It gives more knowledge..."

Lastly, TikTok facilitates faster learning by incorporating core ideas from students numbers 19 and 22, enabling students to learn more efficiently. Additionally, TikTok's Mathematical Videos aid in learning in a short amount of time.

"...learn faster when watching more ideas and more videos."

"...teaches students to learn in a short time."

It was found that out of 34 respondents before watching TikTok Mathematical Videos, 10 students got 0 to 3 points (29.41%), 9 students got 4 to 7 points (26.47%), 9 students got 8 to 11 points (26.47%), 6 students got 12-15 points (17.65%), and 0 got 16 to 20 scores. The highest frequency falls under 0-3. It implies very poor performance, indicating that the students lack prior knowledge about factoring polynomials. The scores are spread in the standard deviation of 4.4346 from the mean, which is 7.0294

After the intervention, the students' post-test scores had a mean of 7.8824 with a standard deviation of 4.7531. There are 10 students who received 0 to 3 points (29.41%), 4 students received 4 to 7 points (11.76%), 11 students received 8 to 11 points (32.25%), 9 students received 12 to 15 points (26.47%), and 0 students received 16 to 20 points. It means that most students have become familiar with the topic as they were marked with satisfactory performance.

The results of the Wilcoxon Signed-Rank Test revealed a statistically significant difference between the pre-test and post-test scores of the students, with a p-value of 0.101. Since $0.101 > 0.05$, the difference is not significant. This means that there is no significant difference between the students' scores on the pre-test and the post-test. The null hypothesis (H0) was not rejected. Though the results of the intervention showed no significant difference from quantitative approach, the respondents' responses with the use of qualitative approach indicated that there were evident advantages of watching TikTok Mathematical Videos based on the themes that emerged from the responses to the open-ended question and are as follows: 1. provides entertainment, 2. makes learning easier, 3. rich in content, and 4. makes learning faster.

Conclusions

The following conclusions were drawn from the study's findings.

Based on the students' performance in the pre-test, it can be inferred that most students lack prior knowledge about factoring polynomials. The reason why some students attained 8 to 11 points and 12 to 15 points was probably because they had an initial idea about polynomials, as it was first introduced in Grade 7.

The result of the Wilcoxon Signed-Rank Test indicates that there is no significant difference in the performance of Grade 7 students in factoring polynomials before and after watching the TikTok Mathematical Videos. There is an evident increase in scores between the pre-tests and post-tests after the intervention, but the difference does not meet the condition for statistical significance. The factors assumed to affect the findings are the duration of the intervention and the research design used in this study. Since TikTok Mathematical Videos were played for a limited time, it is recommended that future researchers interested in this topic consider extending the process of intervention and data collection. Moreover, the interrupted time-series design, a type of quasi-experimental research, can be applied to better assess the results. Instead of administering a single set of pre-test and post-test, numerous observations can be made to examine.

Despite these, TikTok Mathematical Videos were found to have advantages based on the established themes, such that they last for a short amount of time and manage to entertain the students. Its abundant content made the students gain knowledge about the topic, making learning easier and faster. From these results, curricularists and school administrators must develop a curriculum that clearly demonstrates the application of TikTok in learning. Mathematics teachers and future educators should establish a basis for using TikTok Mathematical Videos as supplementary material in teaching Mathematics concepts, such as Factoring Polynomials.

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