JPM UNILA
Jurnal Pendidikan Matematika Universitas Lampung
Vol. 14, No. 1, 2026, pp. 20 – 35
https://jurnal.pbs.fkip.unila.ac.id/index.php/jpm/
ISSN: 2715-856X

Analysis of the Impact of Smartphone on Cognitive-Domain Mathematics Learning Outcomes in Grade VI Elementary School

Intan Suryaningsih[1]*, Khamdun[2], Lovika Ardana Riswari[3]
Muria Kudus University, Kudus, Indonesia
[1] 202133195@std.umk.ac.id ; [2] khamdun@umk.ac.id ; [3] lovika.ardana@umk.ac.id
* corresponding author

ARTICLE INFO

Article history
Received: 10 March, 2026
Revised: 21 March, 2026
Accepted: 22 March, 2026
Published: 31 March, 2026

Keywords
learning outcomes;
mathematics;
smartphone

ABSTRACT

Smartphone use among elementary school students is increasingly widespread, but is often misused for entertainment rather than learning. This is feared to affect learning outcomes, especially in mathematics. This study aims to analyze the impact of smartphone use on the cognitive domain of sixth-grade students' mathematics learning outcomes. This study uses a qualitative approach with a case study type. The research subjects consisted of five sixth-grade students with high, medium, and low learning outcomes categories, as well as sixth-grade teachers. Data collection techniques were carried out through observation, interviews, and documentation, while data analysis was carried out through data collection, data reduction, data presentation, and conclusions. The results of this study indicate that students with high learning outcomes use smartphones as a learning support tool so that it does not interfere with conceptual understanding. For students with medium learning outcomes, smartphones have a dual impact, namely helping in searching for information but also reducing learning focus. Meanwhile, for students with low learning outcomes, the dominant use of smartphones for entertainment has a negative impact on concentration, conceptual understanding, and independence in solving math problems. The conclusion of this study is that smartphones have a significant impact on students' mathematics learning outcomes, especially in the cognitive domain for students with high, medium, and low learning outcomes. The impact is dual in nature, namely it can be a supporter or an obstacle to learning, depending on the intensity, goals and how students utilize it.

How to Cite: Suryaningsih, I., Khamdun & Riswari, L. A. (2026). Analysis of the Impact of Smartphone on Cognitive-Domain Mathematics Learning Outcomes in Grade VI Elementary School. *Jurnal Pendidikan Matematika Universitas Lampung*, *14*(1), 20-35. http://dx.doi.org/10.23960/mtk/v14i1.pp20-35

INTRODUCTION

The development of information and communication technology has brought significant changes to various aspects of life, including the field of education. One of the technologies most closely integrated into daily life is the smartphone. A smartphone, also known as a smart mobile phone, is a multifunctional device equipped with various advanced features. The increasing availability and affordability of smartphones have made many elementary school students accustomed to using them for various purposes, both educational and recreational. According to Nikmawati, et al., (2021), smartphones

are no longer owned solely by adults but have become part of children's daily lives, including elementary school students. In some cases, children are even more proficient in operating smartphones than the adults around them. Wardhi (2023) also states that smartphones have become widespread among people of all ages, both young and old. This phenomenon is driven by ease of access, increasingly affordable prices, and comprehensive features. Smartphones or gadgets provide many benefits, such as assisting with tasks, filling leisure time, providing entertainment, and facilitating social relationships through social media applications. In line with Gustiana (2024), smartphones facilitate communication processes, expand social interactions, and support teaching and learning activities in a more effective and flexible manner.

Smartphones have great potential to support the learning process. Various learning applications, educational videos, and access to online learning resources can be utilized by students to enhance their understanding. However, field conditions show that students' smartphone use is more frequently directed toward entertainment activities such as playing games, watching videos, or accessing social media rather than learning. This phenomenon raises concerns regarding the long-term impact of smartphone use on students' learning outcomes. Excessive smartphone use can reduce study time, decrease focus in the classroom, and even lead to digital addiction that negatively affects students' mental and physical health. In the long term, this may lower learning motivation, hinder cognitive development, and widen academic gaps between students who use technology productively and those who use it primarily for entertainment. Wulandari, et al., (2021a) explain that excessive smartphone use can lead to dependency, declining student discipline, dishonesty, difficulties in absorbing lessons, and behavioral problems. Rachmawati (2022) adds that negative impacts include hindering child development, decreasing academic achievement, increasing the risk of becoming victims of crime, negatively influencing students' behavior and attitudes, and encouraging excessive lifestyles. Therefore, collaboration among parents, teachers, and schools is essential in guiding and supervising students to use smartphones wisely and proportionally.

The impact of smartphone use is closely related to students' learning outcomes at school. Learning outcomes refer to the results obtained by students after participating in learning activities, encompassing knowledge comprehension, attitude formation, and skill development (Rahman, 2021). Similarly, Suciati, et al., (2022) state that learning outcomes are achievements attained by students after engaging in learning activities, reflected in test results administered by teachers and indicating changes in students' attitudes or behaviors. Learning outcomes are generally classified into three domains: cognitive, affective, and psychomotor. Among these domains, cognitive learning outcomes receive significant public attention and require particular focus because they

emphasize knowledge acquisition. According to Bloom's taxonomy, the cognitive domain includes mastery of concepts, ideas, factual knowledge, and intellectual skills. Qorimah & Sutama (2022) explain that cognitive learning outcomes refer to behaviors occurring within the cognitive domain, encompassing changes in abilities such as C1 (remembering), C2 (understanding), C3 (applying), C4 (analyzing), and C5 (evaluating). Measurement of cognitive learning outcomes aims to obtain accurate information regarding students' cognitive abilities.

According to Ula (2021), there is a significant relationship between smartphone use and students' cognitive academic achievement. In Bloom's taxonomy, cognitive levels consist of six stages, where the first to third levels are categorized as lower-order thinking skills (LOTS), while the fourth to sixth levels are categorized as higher-order thinking skills (HOTS) (Riswari & Ermawati, 2025). Therefore, students need to reduce smartphone use for less important activities and allocate more time to reading books or engaging in other positive activities. Marlina & Sholehun (2021) state that one subject with relatively low learning outcomes is mathematics. Mathematics is a compulsory subject taught from elementary school, and parents often introduce basic arithmetic skills to children even before they enter school. Rahmawati, et al., (2023) explain that the primary goal of mathematics learning in schools is to develop students' mathematical thinking abilities and skills. Similarly, Riswari, et al., (2023c) emphasize that mathematics education aims to enable students to solve various problems effectively.

Students tend to feel bored with mathematics because it is often perceived as difficult and uninteresting. This perception leads to low learning motivation and ultimately results in poor mathematics learning outcomes. Parental involvement is also crucial in limiting excessive smartphone use among children. Mujib (2023) argues that in the digital era, parents can play an active role in their children's education by providing guidance in technology use. Through such involvement, parents can supervise children and help them access beneficial content, enabling them to utilize technological advancements appropriately according to their developmental stage.

There are many negative consequences if smartphones are not used wisely, given that sixth-grade students still require adult supervision. Common issues include bullying, fraud, health problems, declining academic performance, and so on. In agreement with Nurhalifah, et al., (2024), the negative impacts experienced by students include increased laziness in studying, disrupted concentration, neglect of duties and responsibilities, vision damage, effects on attitude and behavior, and significant time wastage. These conditions indicate that uncontrolled smartphone use can affect students' study habits, such as reduced study time, decreased concentration during lessons, and low motivation to complete school assignments.

If these conditions persist, they may impact students' academic performance at school. Academic performance is one of the indicators used to assess students' success in understanding the learning material provided by teachers. Excessive smartphone use can lead students to spend more time on recreational activities than on learning, resulting in suboptimal comprehension of the subject matter. This is particularly detrimental to subjects requiring high levels of concentration and practice, such as mathematics.

Observations and interviews with teachers in Grade 6 at SDN 2 Bandungrejo State (Elementary School 2 Bandungrejo) indicate that the decline in student learning outcomes is influenced by the daily use of smartphones. This has a significant impact on students' mathematics performance, which is lower compared to other subjects. All sixth-grade students at this school either own or regularly use smartphones at home. Teachers have also begun to notice changes in students' learning behavior, particularly regarding concentration and mastery of the material. Some students appear unfocused during lessons and struggle to understand the mathematics material presented by the teacher. This situation suggests a potential link between smartphone use and students' mathematics learning outcomes.

However, there have been few studies specifically analyzing the extent to which smartphone use affects students' mathematics learning outcomes at this school. Therefore, research on the impact of smartphones on the mathematics learning outcomes of sixth-grade students at SDN 2 Bandungrejo is important to conduct. Nabila, et al., (2025) The use of gadgets among elementary school students is increasing in line with the development of digital technology. However, excessive gadget use can affect students' motivation and academic achievement. Therefore, it is important to conduct research on the relationship between gadget use and learning outcomes to understand its impact on students' academic achievement. This study is expected to provide insight into the extent to which smartphone use can influence students' learning outcomes, particularly in mathematics. Additionally, the findings of this study are also expected to serve as a basis for teachers and parents in monitoring and guiding children's smartphone use so that it can be utilized more wisely and support the students' learning process.

Based on these issues, an in-depth study on the impact of smartphones on the learning process and students' mathematics learning outcomes is necessary. Therefore, this study aims to examine the impact of smartphone use on the cognitive-domain mathematics learning outcomes of sixth-grade students

METHOD

This study employed a qualitative approach using a case study design. According to Moleong (2016), qualitative research is an approach that focuses on gaining an in-depth

understanding of phenomena experienced by research subjects, such as behavior, perceptions, motivations, and actions. This approach presents findings in the form of verbal descriptions and is conducted within a specific and natural context by utilizing various appropriate methods. In line with Abdussamad (2021), qualitative research is naturalistic in nature, meaning it is carried out in a natural setting without manipulating variables. The research process is not conducted in a laboratory but in the field, so the data obtained reflect the real conditions experienced by the research subjects.

The type of research used in this study was a case study. According to Creswell (as cited in Sugiyono, 2020), a case study is a type of qualitative research that allows researchers to conduct an in-depth investigation of programs, events, processes, or activities related to one or more individuals. Kusumastuti & Khoiron (2019) also state that a case study is a strategy used to examine deeply a program, event, activity, process, or group of individuals. The case under investigation is bounded by specific time frames and activities, and data are collected comprehensively through various data collection techniques according to a predetermined schedule.

This research was conducted at SDN 2 Bandungrejo (State Elementary School 2 Bandungrejo). The research subjects consisted of five sixth-grade students and one sixth-grade classroom teacher. The selection of research subjects was carried out using purposive sampling based on students' cognitive mathematics learning outcomes, which were categorized into high, moderate, and low levels. According to Salmawati (2022), purposive sampling is a sampling technique in which participants are selected based on specific considerations and criteria determined by the researcher.

Data were collected through observation, interviews, and documentation. Observation was used to examine students' learning behaviors and the mathematics learning process in the classroom. Interviews were conducted with both teachers and students to obtain information regarding the impact of smartphone use on mathematics learning outcomes. Documentation was used to complement the research data, including students' mathematics achievement scores, learning records, and other supporting documents.

Data analysis was conducted qualitatively following the stages of data collection, data reduction, data presentation, and conclusion drawing (Sugiyono, 2020). Data obtained from various sources were selected and categorized according to the research focus, then presented in descriptive form to facilitate understanding. Conclusions were subsequently drawn based on emerging patterns and findings. Observations were made to determine the use of smartphones by students in Class VI. Interviews were conducted to 5 sixth grade students and homeroom teachers to obtain information about smartphone usage habits and their impact on mathematics learning activities. data reduction is done

by selecting and summarizing important information from observations, interviews, questionnaires, and documentation. At this stage the researchers selected data related to the use of smartphones by students, smartphone usage time presentation of data, the data is presented in the form of narrative texts, tables, and descriptions of interviews and observations regarding the use of smartphones by students and their impact on math learning outcomes. The initial conclusions put forward are provisional and may change if there is no strong evidence to support them at a later stage of data collection.

The validity of the data in this study is guaranteed through triangulation techniques and sources. Triangulation technique is done by comparing the data obtained through observation, interview, questionnaire, and documentation. Researchers observed the use of smartphones by students, then conducted interviews with students and parents to obtain more in-depth information. While source triangulation is done by comparing information obtained from several sources, namely students of Class VI and homeroom. Researchers collected data from 5 sixth grade students who use smartphones, then compared the information obtained to ensure the suitability of data on smartphone use and its impact on math learning outcomes.

RESULTS AND DISCUSSION

Based on the results of observations, interviews, and documentation conducted in the sixth grade of SDN 2 Bandungrejo, it was found that smartphones have become an integral part of students' daily lives. All sixth-grade students were identified as owning or regularly using smartphones at home. Students' smartphone use was predominantly oriented toward entertainment activities, such as playing games, watching videos, and accessing social media, rather than for learning purposes

The Sixth-Grade Teacher's Perspective on Smartphone Use

Based on interviews with the sixth-grade homeroom teacher at SDN 2 Bandungrejo, it was found that students are not permitted to bring smartphones into the classroom. This policy is implemented because smartphone use is considered potentially disruptive to students' learning concentration and poses a risk of loss during instructional activities. According to the teacher, although smartphones are not used in the classroom, their influence is still evident in students' learning outcomes, particularly in the cognitive domain of mathematics.

The teacher explained that smartphone use among students primarily affects cognitive abilities, especially concentration and conceptual understanding in mathematics. Furthermore, the teacher also utilizes smartphones as supporting learning resources and media, one of which is through the use of the Quizizz application. In line with Yasin, et al., (2023), the use of mobile learning applications as learning tools

provides accessible sources of information for students, thereby supporting more effective learning outcomes. Effective learning occurs when there is positive interaction between teachers and students, enabling actively involved students to achieve better learning success (Riswari et al., 2023a).

According to the teacher, traditional learning in the past positioned teachers as the center of the learning process, with textbooks serving as the primary learning resources. Students' tasks were limited to summarizing materials or completing exercises, resulting in conventional teaching methods that tended to make learning monotonous. Therefore, engaging learning strategies are required to increase students' motivation and interest in learning mathematics. As stated by Riswari, et al., (2023b), in order for learning objectives to be truly achieved, students' creativity in solving mathematical problems must be developed. Consequently, teachers need to implement creative and innovative mathematics learning approaches.

However, the teacher acknowledged that outside the school environment, students tend to use smartphones more frequently for non-academic activities, such as accessing social media and playing online games. This condition is considered to potentially disrupt students' study time at home. To address this issue, Mr. Abdullah actively provides guidance to students and collaborates with parents or guardians to limit smartphone use at home.

As a form of control effort, Mr. Abdullah encourages parents to set time limits on smartphone use, monitor students' access through parental control applications such as Family Link, and direct students toward educational applications and content. Through these measures, smartphones are expected to be utilized as effective learning-support tools and not have a negative impact on students' mathematics learning outcomes.

Overview of Students' Smartphone Use

The results of observations and interviews indicate that all sixth-grade students at SDN 2 Bandungrejo own and use smartphones in their daily lives. Smartphones are used for various activities such as playing online games, watching YouTube, and accessing social media platforms including WhatsApp, TikTok, and Instagram. Some students also use artificial intelligence applications to support their mathematics learning. However, the utilization of smartphones for learning activities, particularly mathematics, remains relatively low and is only conducted occasionally. Most of students' time is spent using smartphones for non-academic purposes, especially those unrelated to mathematics learning.

The dominant use of smartphones for entertainment has resulted in reduced study time at home. According to Wulandari, et al., (2021b), excessive smartphone use can lead

to dependency, decreased student discipline, dishonesty, difficulties in absorbing learning materials, and negative effects on student behavior.

Limited parental supervision allows students to use smartphones without clear time restrictions, which consequently reduces learning intensity and concentration, particularly in mathematics. In line withRiduan & Aminudin (2025), parental involvement in monitoring children's activities plays a crucial role in supporting their social and emotional development. Active parental engagement in children's daily lives, including supervision of digital media use and social interactions, is necessary to ensure optimal child development. These findings indicate that smartphones function as an external factor influencing both the learning process and students' learning outcomes.

The Positive Impact of Smartphone

The researcher used students' daily mathematics test scores from the first semester of Grade VI as data sources. Based on the results of interviews and observations, it was found that smartphone use has varied impacts on students' cognitive-domain mathematics learning outcomes. The cognitive domain is related to students' ability to understand concepts, explain material in their own words, and solve mathematical problems logically and systematically. Differences in the impact of smartphone use were evident among students, depending on the intensity and manner in which smartphones were utilized for learning purposes.

1. Subject ANS

ANS students showed the highest cognitive abilities compared to other students. The use of smartphones does not have a significant impact on the understanding of mathematical concepts ANS. ANS is able to understand the material well, explain mathematical concepts using their own words, and solve problems with coherent and logical steps. ANS at home make good use of smartphones, for example by looking for formulas, tutorials, or math exercises.

"No, because I use it to study" (ANS)

The quote confirms that ANS has no difficulty when understanding mathematical material because he often uses a smartphone.

In the process of learning in the classroom, ANS looks active and focused. Despite this, on some occasions ANS still utilize smartphones as an additional source and do not always double-check answers before they are collected. This shows that although the cognitive ability of the ANS is high, the use of smartphones still has the potential to affect accuracy in learning. smartphones do not necessarily negatively impact students ' math learning outcomes. Students with high cognitive abilities, such as ANS, are still able to understand mathematical concepts well despite having access to smartphones. This shows that students who have good motivation to learn and self-control are not easily distracted

by the use of smartphones. Smartphones are actually used as an additional source to support understanding of the material. In line with the opinion Gustiana (2024) along with scientific and technological progress, the use of smartphones provides three main functions and benefits, namely in the fields of communication, social, and education. Smartphones facilitate the communication process, expand social interaction, and support teaching and learning activities more effectively and flexibly

2. Subject AKA

AKA shows the dual impact of smartphones on the learning outcomes of cognitive mathematics. Smartphones help AKA in understanding the material and looking for additional information so that the mathematical value obtained has increased. AKA is able to explain mathematical concepts and provide examples of application in everyday life quite well. However, uncontrolled use of smartphones also makes AKA sometimes less focused on learning. You spend more time playing games or playing social media than you spend learning.

"because many applications”

"Tiktok, Capcut WhatsApp”

The quote confirms AKA likes to play smartphone because according to him many social media applications rather than using it to find out about learning. This can be seen from AKA's habit of still taking longer to solve problems and the tendency to ensure answers with the help of digital media. This condition shows that smartphones can improve understanding, but can also inhibit independent learning if not used wisely. Smartphones help students in understanding the material through the search for information or learning videos, but on the other hand also cause students to be less independent and less thorough in solving problems. This can be seen from the habits of students who still need digital help in ensuring answers. Wulandari, et al., (2021a) the effect of excessive smartphone use causes dependence on smartphones, student discipline decreases, often lies, difficulty absorbing lessons, affects student behavior. These conditions indicate that smartphones can help early understanding, but have not yet fully encouraged students ' independent thinking skills

3. Subject MRM

MRM students, smartphone use has a moderate impact on cognitive ability. MRM is able to understand the basic concepts of mathematics and solve problems with fairly coherent steps, especially after obtaining an explanation and direction from the teacher. Smartphones are used MRM as a medium to watch learning videos that help understand the material. However, MRM more often use his smartphone to play games.

"Great place to play games and socialize”

The quote confirms MRM prefers to use his smartphone as a means of entertainment, not for learning.

MRM still has difficulty in giving logical reasons to the answers and solving the problems on time. This suggests that smartphones help at an early stage of understanding, but do not yet fully support a thorough deepening of mathematical concepts. smartphones have a dual impact. Smartphones help students in understanding the material through the search for information or learning videos, but on the other hand also cause students to be less independent and less thorough in solving problems. Smartphone should be used properly as a support for the learning process. In the teaching and learning process, students should be required to be independent in the current situation, where students must be able to utilize technology to find other sources to add information in accordance with the material taught by teachers, and to be able to independently work on the problems given Sari, et al., (2021) this can be seen from the habits of students who still need digital help in ensuring answers. These conditions indicate that smartphones can help early understanding, but have not yet fully encouraged students ' independent thinking skills.

The Negative Impact of Smartphone

4. Subject E

E students were the students who showed the greatest negative impact of smartphone use (low category) on their cognitive abilities. E has a gagguan of distance vision which makes it difficult to understand the material presented by the teacher. Therefore, E has difficulty in understanding mathematical material, explaining concepts, and solving problems with systematic steps. Smartphones are more used E for entertainment activities, such as watching videos and playing games, thus reducing concentration and attention when learning mathematics. As a result, E rarely practiced doing problems and showed low cognitive domain math learning results compared to other students. Smartphones are more used for entertainment, so students become less focused, rarely practice doing problems, and tend to rely on the help of Google or a calculator.

"Math scores decline due to frequent smartphone Play”
“Tiktok, game”
"I learn when I want to repeat or if I want to”
"I rarely study at home”

The quote confirms that E has decreased math scores due to addiction by smartphones, usually E opens tiktok applications and games. Smartphones make it lazy to learn, E only learn when you want to repeat.

This habit hinders the understanding of mathematical concepts and leads to low student learning outcomes. Irregular use of smartphones can interfere with student

learning focus and productivity, which can ultimately lead to decreased academic performance (Nasri & Indinabila, 2024).

5. Subject NI

NI students showed the negative impact of smartphone use on cognitive mathematics learning outcomes. NI has difficulty in understanding mathematical concepts and re-explaining the material in his own words. The use of smartphones that are quite intense causes NI less focus when learning takes place, so that the impact on the low ability to solve problems logically and on time. In addition, NI also tends to rely on the help of Google or a calculator in doing math problems when at home so that this habit causes understanding of mathematical concepts NI becomes less optimal and does not develop independently.

"cheating on a friend"
"sometimes learning"
"friends and smartphones"

The quote confirms NI has a lazy nature of learning and tends to rely on his friends when learning mathematics. NI also relies on google's help on smartphones to find additional explanations for what it doesn't know.

Based on the findings from five Grade VI students categorized into high, moderate, and low learning outcome groups, it can be concluded that smartphone use has diverse effects on students' cognitive-domain mathematics learning outcomes. These differences are influenced by the intensity of smartphone use, the purpose of its use, and students' ability to manage their study time. Students who are able to use smartphones purposefully as learning-support tools tend to demonstrate better conceptual understanding, are able to explain material in their own words, and solve problems more systematically.

Conversely, excessive and uncontrolled smartphone use tends to generate negative impacts on students' cognitive abilities. Students become less focused during learning activities, are easily distracted, and consequently develop suboptimal understanding of mathematical material. Frequent smartphone use may also disrupt sleep patterns, which negatively affects concentration during the learning process (Zulfa & Mujazi, 2022). Furthermore, students tend to depend on instant tools such as search engines and calculators. This dependency hinders the development of logical thinking, mathematical reasoning, and independent problem-solving skills, causing difficulties when students face problems requiring deep conceptual understanding and mathematical logic.

The findings also indicate that unbalanced smartphone use affects students' learning habits. Study time that should be allocated for practicing mathematics problems is reduced due to increased engagement in entertainment activities. This condition results in fewer practice opportunities and limited reinforcement of mathematical concepts. This

is consistent with findings stating that excessive smartphone use may hinder students' learning processes (Nuraliyah, et al., 2022). Therefore, although smartphones have strong potential as learning-support media, their use must be guided and regulated wisely. The roles of teachers and parents are essential in providing supervision, guidance, and positive learning habits so that smartphones can be optimally utilized to enhance students' mathematics learning outcomes, particularly in the cognitive domain. Technological advancement has significantly transformed education, including the use of creative learning methods through animations and interactive media (Riswari, et al., 2025).

Observations also revealed differences in smartphone usage patterns among students with high, moderate, and low mathematics learning outcomes. Students with high achievement levels tend to use smartphones as learning-support tools, such as searching for learning materials, watching instructional videos, and finding example problems when experiencing difficulties. They also demonstrate habits of saving or recording important materials obtained through smartphones, indicating directed and constructive use that supports conceptual understanding. Students with moderate learning outcomes show more varied usage patterns, combining academic and entertainment purposes. Although smartphones are still used to support learning, academic focus is sometimes disrupted, resulting in less optimal use for learning. Meanwhile, students with low learning outcomes predominantly use smartphones for non-academic activities. Entertainment use outweighs learning-related use, and these students tend to struggle with maintaining focus and completing mathematics tasks on time. This condition suggests that poorly controlled smartphone use can reduce student engagement in learning activities.

Overall, the impact of smartphone use on mathematics learning is strongly influenced by students' ability to manage its use. For high-achieving students, smartphones function as tools for independent learning, enabling deeper conceptual understanding and access to additional learning resources. In contrast, for low-achieving students, smartphones often become sources of distraction, reducing study time and concentration. Students with moderate achievement levels lie between these two conditions, showing potential to benefit from smartphone use but still requiring guidance to ensure academic-focused utilization. Thus, smartphones do not directly determine students' mathematics achievement levels; rather, they function as either supporting or inhibiting factors depending on how students manage their use

CONCLUSION

Based on the results and discussion regarding the impact of smartphone use on the mathematics learning outcomes of sixth-grade students at SDN 2 Bandungrejo (State

Elementary School 2 Bandungrejo), it can be concluded that smartphones have a significant impact on students' mathematics learning outcomes, particularly in the cognitive domain. This impact is dual in nature, as smartphones can function as either facilitators or barriers to learning, depending on the intensity, purpose, and manner in which students use them.

Uncontrolled smartphone use that is predominantly oriented toward entertainment activities, such as playing games and accessing social media, tends to negatively affect students' concentration, understanding of mathematical concepts, and learning habits. This condition reduces study time and limits students' ability to solve problems that require mathematical understanding and reasoning. In contrast, students who are able to use smartphones wisely as learning-support media demonstrate better conceptual understanding and more optimal mathematics learning outcomes. Differences in smartphone usage patterns are clearly observed among students with high, moderate, and low learning outcomes. Students with high achievement levels tend to use smartphones in a more directed and educational manner, while students with low achievement levels more frequently use smartphones for non-academic activities. Therefore, smartphones do not directly determine students' mathematics achievement levels but serve as either supporting or inhibiting factors depending on how they are managed.

Thus, the roles of teachers and parents are crucial in guiding, supervising, and directing smartphone use so that it can be utilized positively as a learning-support tool. Effective supervision, time-use limitations, and the utilization of educational content are expected to contribute to improving students' mathematics learning outcomes, particularly in the cognitive domain.

REFERENCE

Abdussamad, Z. (2021). *Metode Penelitian Kualitatif*. CV. Syakir Media Press.

Gustiana, A. D. (2024). *Model Induktif Kata Bergambar Berbantuan Smartphone (Mikbbs) dalam Meningkatkan Literasi Siswa Sekolah Dasar*. Damera Press.

Kusumastuti, A., & Khoiron, A. M. (2019). *Metode Penelitian Kualitatif*. Lembaga Pendidikan Sukarno Pressindo (LPSP).

Marlina, L., & Solehun. 2021. Analisis Faktor-Faktor yang Mempengaruhi Hasil Belajar Bahasa Indonesia pada Siswa Kelas IV SD Muhammadiyah Majaran Kabupaten Sorong. *Frasa: Jurnal Keilmuan, Bahasa, Sastra, dan Pengajarannya*, 2(1), 66–74.

Moleong, L. J. (2016). *Metodologi Penelitian Kualitatif (Tiga Puluh)*. PT Remaja Rosdakarya.

Mujib, A. (2023). Sosialisai Dampak Negatif Penggunaan Smartphone Terhadap Perkembangan Anak Tanpa Pengawasan Orang Tua. *Adzkiya: Jurnal Pengabdian Masyarakat*, 1(2), 1–8.

Nabila, N., Febriani, N., Adrias, A., & Zulkarnaini, A. P. (2025). Studi Literatur: Dampak Penggunaan Gadget Pada Minat Siswa dan Hasil Belajar Peserta Didik di Sekolah Dasar. *Jurnal Pendidikan Transformatif (JPT)*, *4*(2), 147–153.

Nasri, U., & Indinabila, Y. (2024). Community Engagement: Meningkatkan Kesadaran tentang Dampak Positif dan Negatif Penggunaan Smartphone di Kalangan Siswa SMA NW Syaikh Zainuddin Anjani, Lombok Timur, NTB. *JMM - Jurnal Masyarakat Merdeka*, 7(1), 37. https://doi.org/10.51213/jmm.v7i1.149

Nikmawati, N., Bintoro, H. S., & Santoso, S. (2021). Dampak Penggunaan Gadget terhadap Hasil Belajar dan Minat Belajar Siswa Sekolah Dasar. *Jurnal Edutech Undiksha*, 9(2), 254–259.

Nuraliyah, E., Fadilah, A., Handayaningsih, E., Ernawati, E., & Oktadriani, S. L. (2022). Penggunaan Handphone dan Dampaknya bagi Aktivitas Belajar. *Ideas: Jurnal Pendidikan, Sosial, dan Budaya*, 8(4), 1585. https://doi.org/10.32884/ideas.v8i4.961

Nurhalifah, Rizaldi, D. R., Muktofan, Nilwan, & Fatimah, Z. (2024). Dampak Positif dan Negatif Penggunaan Smartphone Terhadap Prestasi Belajar Siswa. *ARJ: Action Research Journal*, 1(1), 10–17. https://doi.org/10.63987/arj.v1i1.22

Qorimah, E. N., & Sutama, S. (2022). Studi Literatur: *Media Augmented Reality* (AR) Terhadap Hasil Belajar Kognitif. *Jurnal Basicedu*, 6(2), 2055–2060. https://doi.org/10.31004/basicedu.v6i2.2348

Rachmawati, N. H. (2022). Pengaruh Smartphone Terhadap Prestasi Belajar Siswa Sekolah Dasar. *Jurnal Warta Desa (JWD)*, 4(2), 79–85. https://doi.org/10.29303/jwd.v4i2.172

Rahman, S. (2021). Pentingnya Motivasi Belajar dalam Meningkatkan Hasil Belajar. *Prosiding Seminar Nasional Pendidkan Dasar*. Universitas Negeri Gorontalo.

Rahmawati, S. T., Wijayama, B., Rahmayanti, N., & Utami, C. P. C. (2023). *Media Pembelajaran Matematika Sekolah Dasar Era Digital.* Cahaya Ghani Recovery.

Riduan, M., & Aminudin, A. (2025). Efektivitas Kominikasi Interpersonal Prang Tua dalam Mengatasi Efek Negatif Penggunaan Smartphone pada Anak Sekolah SDN Gajahrejo 01. *Jurnal Al-Qolamuna: Jurnal Komunikasi dan Penyiaran Islam*, 2, 275–287. https://doi.org/10.35631/ijlgc.6230010

Riswari, L. A., & Ermawati, D. (2025). Pelatihan Penyusunan Soal Berbasis HOTS (Higher Order Thinking Skill) dalam Kurikulum Merdeka untuk Guru Sekolah Dasar. *Jurnal Abdimas Kartika Wijayakusuma*, 6(2). 649-657. https://doi.org/10.26874/jakw.v6i2.335

Riswari, L. A., Ermawati, D., & Mustofa, H. A. (2025). Mathematics Learning Transformation through MESSI LARI Application: Critical Thinking Educative Game for Elementary Students. *Jurnal Pendidikan Progresif*, 15(3), 1846–1863. https://doi.org/10.23960/jpp.v15i3.pp1846-1863

Riswari, L. A., Fitriana, V., Syafrudin, I. M., & Purnama, Y. A. (2023a). Implementasi Model Problem Based Learning (PBL) Berbantu Media Catung untuk Meningkatkan Kemampuan Berpikir Kritis. *Gammath: Jurnal Ilmiah Program Studi Pendidikan Matematika*, *8*(2), 74–82. https://doi.org/10.32528/gammath.v8i2.686

Riswari, L. A., Munnah, S., & Nuha, S. A. P. (2023b). Analisis Kreativitas Siswa dalam Pemecahan Masalah Matematis Pada Materi Pecahan di Kelas IV SD Negeri Kadilangu 1. *Jurnal Lensa Pendas*, 8(2), 161–170. https://doi.org/10.33222/jlp.v8i2.3117

Riswari, L. A., Septiana, E., & Saidah, R. A. (2023c). Analisis Kemampuan Pemecahan Masalah Matematis Siswa Kelas I SD. *Indonesian Journal of Elementary Education*, 5(1). http://dx.doi.org/10.31000/ijoee.v5i1.8779

Salmawati, S. (2022). Pengaruh Motivasi Belajar Dalam Pembelajaran Daring Terhadap Hasil Belajar Matematika Peserta Didik Kelas VIII SMP Negeri 3 Tongauna. *SIBATIK JOURNAL: Jurnal Ilmiah Bidang Sosial, Ekonomi, Budaya, Teknologi, dan Pendidikan*, 1(6), 979–986. https://doi.org/10.54443/sibatik.v1i6.115

Sari, Y., Kamid, K., & Rusdi, M. (2021). Analisis Kemampuan Pemecahan Masalah Matematis Siswa SMK Terhadap Pembelajaran Trigonometri Secara Online Berbantuan Android Ditinjau dari Kemandirian Belajar Siswa. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *6*(1), 58-68. https://doi.org/10.31004/cendekia.v6i1.715

Suciati, I., Hapsan, A., & Rahmawati. (2022). *Efikasi Diri dan Hasil Belajar Matematika: Suatu Kajian Meta-Analisis*. CV Ruang Tentor

Sugiyono. (2020). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Ula, W. R. R. (2021). Dampak Kecanduan Smartphone Terhadap Prestasi Belajar Siswa. Tunas Nusantara, 3(1), 290-298.

Wardhi, N. P. W. (2023). *Perlukah Penggunaan Gawai di Sekolah?*. Pusat Pengembangan Pendidikan dan Penelitian Indonesia.

Wulandari, A. R., Masturi, M., & Fakhriyah, F. (2021a). Pengaruh Media Pembelajaran Berbasis Youtube terhadap Hasil Belajar IPA Siswa di Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, 3(6), 3779–3785. https://doi.org/10.31004/edukatif.v3i6.1251

Wulandari, S. P., Umayaroh, S., & Mahanani, P. (2021b). Analisis Dampak Negatif Penggunaan Smartphone pada Pembelajaran Daring Ditinjau dari Perilaku Anak Kelas V SD. *Jurnal Pembelajaran, Bimbingan, dan Pengelolaan Pendidikan*, 1(6), 456–464. https://doi.org/10.17977/um065v1i62021p456-464

Yasin, M., Kelrey, F., Ghony, M. A., Syaiful, M., Karuru, P., Pertiwi, A., Abadi, A., Ardiansyah, W., Kabanga, T., & Aryanti, N. (2023). *Media Pembelajaran Inovatif: Menerapkan Media Pembelajaran Kreatif untuk Menyongsong Pendidikan di Era Society 5.0*. PT Sonpedia Publishing Indonesia.

Zulfa, N. A., & Mujazi, M. (2022). Pengaruh penggunaan smartphone terhadap konsentrasi belajar siswa. *JRTI (Jurnal Riset Tindakan Indonesia)*, 7(3), 574. https://doi.org/10.29210/30032126000