ARZUSIN
Jurnal Manajemen dan Pendidikan Dasar

e-ISSN : 2809-4093
p-ISSN : 2809-4484

Terindeks: Sinta 5, Copernicus, Dimensions, Scilit, Lens, Semantic Scholar, Garuda, Google, Base, etc.

https://doi.org/10.58578/arzusin.v6i3.9823

ONLINE GAMES BETWEEN RISK AND POTENTIAL: A STUDY OF LEARNING MOTIVATION AND DIGITAL SCIENCE LITERACY

Maria Hanifah[1] & Nazri Adlani[2]
[1]STAIN Mandailing Natal, Indonesia; [2]IAIN Takengon, Indonesia
maria.hanifah05@gmail.com; nazriadlani15@gmail.com

Article Info:

Submitted:	Revised:	Accepted:	Published:
Mar 15, 2026	Apr 12, 2026	Apr 24, 2026	Apr 29, 2026

Abstract

The phenomenon of online gaming addiction among sixth-grade students at MIN 1 Aceh Tengah has become an important issue because it is related to students' learning motivation and digital science literacy. The tendency to play online games is considered to affect enthusiasm, focus, and learning habits, which are influenced by both internal and external factors. This study aimed to analyze the impact of online gaming addiction on students' learning motivation and digital science literacy, as well as to identify internal and external factors that influence the relationship between online gaming activities and learning motivation. This study used a descriptive qualitative approach with research subjects consisting of teachers and sixth-grade students. Data were collected through observation, interviews, and documentation, and were then analyzed through the stages of data reduction, data presentation, and conclusion drawing. The results showed that online gaming addiction affected students' learning motivation in various ways. Students who played without self-control and received limited parental supervision experienced a decline in concentration and learning enthusiasm, whereas students who were able to manage their time and

Arzusin is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

received parental support showed increased motivation, perseverance, and critical thinking skills. The development of digital science literacy was evident in the use of gadgets to search for science materials through Google, watch learning content through YouTube, and ask for answers to science questions through the Gemini application. Internal factors influencing this relationship included self-control, interest, and learning habits, whereas external factors included parental supervision, peer environment, and digital facilities. The conclusion of this study confirms that balanced management of online gaming activities, accompanied by self-control and parental supervision, plays an important role in maintaining learning motivation and supporting the development of students' digital science literacy.

Keywords: Online Gaming Addiction; Learning Motivation; Digital Science Literacy; Self-Control; Parental Supervision

INTRODUCTION

Advances in information and communication technology in the digital era have brought about significant changes in various aspects of human life, including education and children's entertainment. One of the most popular forms of entertainment among students today is online games (Akbar & Hasrullah, 2025). Initially, online games were created as a recreational tool to relieve boredom while also developing players' cognitive, social, and motor coordination skills. However, easy internet access and digital devices have led many children and adolescents to spend excessive amounts of time playing games, leading to addictive behavior (gaming disorder) (Anggarani, 2015), which has even been recognized by the World Health Organization (WHO) as a form of mental health disorder (Novrialdy, 2019).

The phenomenon of online gaming addiction has now become a serious social and educational problem. Online gaming addiction negatively impacts various aspects of adolescent life, including health, psychological well-being, social well-being, academic well-being, and financial well-being (Novrialdy, 2019). Teenagers who are addicted generally lose their ability to control themselves, neglect their learning responsibilities, and experience a decline in academic performance. Research by Jap, Tiatri, Jaya, & Suteja also shows that 10.15% of Indonesian adolescents are indicated to be addicted to online games, meaning one in ten adolescents is at high risk of this behavioral disorder (Jap et al., 2013).

The results of Rahayu et al.'s research strengthen these findings by showing that 70.2% of school-age children experienced addiction to playing online games during the

COVID-19 pandemic, and this condition was directly related to a decrease in students' learning motivation (Rahayu et al., 2021). Students who spend too much time playing tend to lose enthusiasm for learning, have difficulty concentrating, and often procrastinate on schoolwork. Conversely, students who exercise self-control and receive parental supervision can manage their playing time and maintain their motivation to learn.

Another study conducted by Radandi et al. also found a negative correlation between online gaming addiction and adolescents' social skills ($\rho = 0.301$). Individuals who play games excessively tend to have lower social interaction skills than those who are able to control the intensity of their playing (Radandi et al., 2023). In other words, online game addiction not only affects academic achievement, but also hinders students' social and emotional development.

Meanwhile, the author's observations at MIN 1 Aceh Tengah revealed that some students spend more time playing online games than studying. Some fifth-grade students even admitted they prefer playing games after school to reviewing their lessons. This situation suggests that online gaming has shifted students' study time priorities. Factors such as lack of parental supervision, easy internet access, and the influence of the gaming environment contribute to this habit.

In the context of education, learning is the process of changing an individual's behavior through experience and interaction with the environment, encompassing the cognitive, affective, and psychomotor domains. Meanwhile, learning motivation is the internal and external drive that drives a person to be willing and persistent in learning activities to achieve Maslow's goals in the hierarchy of needs theory. Without motivation, learning activities are difficult to carry out effectively. Therefore, if a student's learning motivation decreases due to online game addiction, the learning process will be hampered.

In addition to affecting learning motivation, online game addiction also impacts students' digital science literacy. Science literacy encompasses not only the understanding of scientific concepts but also the ability to think critically, solve problems, and apply scientific knowledge in everyday life (OECD, 2019). However, students addicted to online games tend to be more cognitively passive and less engaged in reflective activities that can improve scientific literacy. Reduced learning time due to excessive gaming also deprives students of opportunities to read, experiment, and analyze scientific phenomena around them.

On the other hand, students with good digital science literacy are able to utilize technology productively for learning, and research shows that both teachers and students are

happy and enthusiastic about using digital-based scientific literacy assessments (Purba, 2023). Meanwhile, those with low literacy tend to use technology solely for entertainment. This suggests a close relationship between Online Gaming Disorder, learning motivation, and scientific literacy. Low scientific literacy can exacerbate addictive tendencies toward gaming, while strong learning motivation can act as a protective factor against such behavior.

In addition to diminishing the enthusiasm for learning, online gaming addiction also has various other negative impacts, including: a) wasting time and money, b) creating a psychological dependency that is difficult to control, and c) causing individuals to forget to eat, pray, and study.

This addiction phenomenon is not only found in middle and high school students, but is also beginning to infect elementary school-aged children and even Islamic elementary schools. This is certainly a serious concern for the world of education, as it is at this age that the foundations of character, discipline, and a passion for learning are being built.

However, not all impacts of online gaming are negative. If managed properly, games can also be an effective learning tool. Several studies have shown that certain digital games can foster students' fighting spirit, concentration, teamwork, and strategic thinking skills. This means that the effect of online gaming on learning motivation is two-way: it can be a threat if uncontrolled, but it can also be a motivational tool when directed positively.

Based on this description, it is clear that the phenomenon of online gaming addiction is a complex issue and requires further study. Therefore, the study, entitled "Online Game Addiction: Between Threats and Learning Motivation A Case Study of MIN Students," is important to understand the extent to which online gaming habits affect the learning motivation of madrasah students, and how self-control and parental supervision can minimize its negative impact. This research is expected to provide an analytical overview of the relationship between online game addiction and learning motivation, as well as provide input for teachers, parents, and schools in guiding students to utilize digital technology in a balanced manner - making games not a threat to achievement, but a means that can foster a spirit of learning, creativity, and responsibility in the modern era. The purpose of this study is to analyze how online game addiction affects students' learning motivation and to identify the effect of online game addiction on digital science literacy.

METHODS

This study aims to determine the extent of the influence of online games on students' learning motivation and digital science literacy, particularly the negative impacts they cause, such as declining health, mental disorders, decreased academic achievement, consumer behavior, and difficulties in socializing. To achieve this goal, the researcher used a qualitative approach, namely an approach that focuses on revealing the meaning behind a social phenomenon through direct observation and human interaction in its natural context (J, 2017). Qualitative research is interpretive in nature, so it not only examines physical facts but also explores the meaning behind the behaviors and problems studied.

This research was conducted at MIN 1 Aceh Tengah, located in Bahgie Village, Bebesen District. The research period included field observation, data collection, data processing, proposal development, and guidance, which lasted approximately one week. The data sources in this study consisted of primary and secondary data. Primary data were obtained from interviews with the principal, teachers, and students involved in online game addiction cases. Secondary data came from school documents, student data, environmental conditions, and the effectiveness of face-to-face learning.(J, 2017).

Data collection techniques include direct observation, structured interviews, and documentation. Observations are used to assess the school's environmental conditions, facilities, infrastructure, geographic location, and student activities (Sari et al., 2025). Structured interviews were conducted with the principal, teachers and students to obtain data related to online gaming habits and their impact on the learning process (Arikunto, 2014). Documentation was used as supporting data in the form of archives, school records, and administrative data relevant to the research.

Data analysis was conducted inductively, drawing conclusions based on patterns emerging from the field data. Data validity was ensured through source triangulation techniques, which involved comparing observational data with interview results and documents, as well as comparing interview results between informants (Patton dalam Moleong, 2017). In addition, extended observations and observational diligence were carried out to ensure that the data obtained were truly accurate, consistent, and reliable as a basis for drawing research conclusions.

Tabel 1. Indicator Instruments Digital Science Literacy

No	Key Indicators	Measurable Behavior Sub-Indicators	Scale/Description
1	Ability to search and access digital data/information	- Students are able to use search engines (Google/YouTube) to find the information they need. - Students are able to type relevant	Observed / Not Observed
2	Ability to sort data/information	- Students can select information that suits their learning needs. - Students are not easily fooled by irrelevant information. - Students can distinguish between educational and entertainment content.	Observed / Not Observed
3	Ability to organize digital data	- Students can save links/videos/materials to bookmarks, folders, or notes. - Students are able to organize simple digital files.	Observed / Not Observed
4	Ability to direct search activity	- Students are able to change or adjust keywords if the first results are not suitable. - Students can choose the digital platform according to their needs (Google for articles, YouTube for videos).	Observed / Not Observed

RESULTS

In today's era of technological advancement, the use of digital media, such as online games, is increasingly widespread, including among elementary school and Islamic elementary school students. This phenomenon was also observed among sixth-grade students at MIN 1 Central Aceh, where the majority of students tended to spend more time playing online games than studying. This condition resulted in a decline in student enthusiasm for learning and impaired concentration during the learning process.

Based on observations and interviews, it was found that students were more interested in discussing online games than discussing the subject matter. This resulted in slowed academic progress and changes in their daily behavior. This phenomenon was reinforced by the statement of the sixth-grade homeroom teacher, Suryani, S.Pd.I., who stated that online games have the potential to have negative impacts on students if played excessively. She emphasized that students who play online games excessively will experience direct impacts, such as decreased focus on learning and increased dependence on games. Therefore, intensive guidance from teachers and parental supervision are needed to minimize these negative impacts.

In practice, the intensity of online game play varies from student to student. These differences are influenced by various factors, such as social environment and level of interest in specific games. Students with friends who actively play games tend to spend longer playing

time, increasing the risk of addiction. Conversely, students who are less interested in gaming will spend shorter playing time.

Furthermore, Suryani, S.Pd.I., explained that students who play online games excessively tend to forget their role as students. They make gaming their top priority over studying. This condition is one indicator of online gaming addiction in students. This addiction is characterized by students' difficulty controlling themselves and a strong urge to continue playing despite being aware of the negative impacts.

This phenomenon of difficulty controlling themselves is also reinforced by AR's statement, who revealed that it is very difficult for him to stop playing once he has started. In fact, he feels disturbed if his playing activity is interrupted midway. He also admitted that games like Free Fire make him lose track of time and play until late at night. This indicates that online games have a high appeal, which can influence students' self-control.

Furthermore, the diversity of online game types also contributes to student interest. Based on interviews, some popular games among students include Free Fire, Mobile Legends, PUBG, and Hago. However, the most popular game is Free Fire, which falls into the category of Massively Multiplayer Online First-Person Shooter Games (MMOFPS), meaning shooting games involving multiple players simultaneously.

According to Suryani, S.Pd.I, most sixth-grade students prefer this game because it's fun, relieves boredom, and allows for social interaction with friends. This sentiment is further reinforced by statements from students like NA and RA, who stated that they enjoy the game because it allows for play with friends and allows for direct communication even when they're in different locations.

On the other hand, not all students experience the same addiction. A revealed that he still plays online games, but is able to manage his time between playing, helping his parents, and studying. This indicates differences in the level of self-control among students.

From a parental perspective, concerns about the impact of online gaming are also quite high. Mariam stated that she is concerned because her child spends up to 4–5 hours per day playing games. This condition causes the child to neglect his studies. Similarly, Warti revealed that despite repeated prohibitions, her child continues to play games. She also identified both positive and negative impacts of online gaming. Positive impacts include social skills and a slight improvement in English language skills, while negative impacts include laziness, lack of social interaction, health problems, and the emergence of inappropriate behaviors such as the use of foul language.

In addition to individual factors, external factors also play a role in increasing the intensity of online gaming. One of these is a lack of parental supervision. Suryani, S.Pd.I., stated that a lack of parental concern and supervision is one of the main causes of students misusing time to play games. This is reinforced by FZ's statement, which revealed that friends' invitations, such as joining online gaming tournaments, also influence playing habits.

In the context of learning motivation, online games have a significant impact. Students who play games excessively tend to experience decreased learning motivation. They become lazy, often procrastinate, and lack focus during lessons. This was conveyed by M, who admitted that he often lost track of time, including studying, eating, and interacting with family, due to being too engrossed in gaming.

Nevertheless, some students recognize the negative impacts of this habit and desire to reduce the intensity of playing. However, these efforts are often difficult due to the high level of dependence on online games.

Based on the results of an in-depth analysis of the study subjects, variations in the level of online game addiction were found among students. Subjects AR, NA, and RA were categorized as addicted, characterized by playing for 5–6 hours per day, an inability to control themselves, and ignoring the negative impacts that arise. Meanwhile, subjects A and FZ were not categorized as addicted because they were still able to manage their time and recognize the consequences of gaming activities.

Overall, the results of this study indicate that online games have a significant influence on students' learning motivation. This influence can be positive or negative, depending on the intensity of use and the students' ability to control themselves. However, the negative impacts are more pronounced in students who experience addiction, particularly in the form of decreased motivation to learn, impaired concentration, and changes in social behavior.

Therefore, an active role is needed from teachers and parents in providing guidance, supervision, and creating more positive alternative activities. With synergy between schools and families, it is hoped that students will be able to use technology wisely without neglecting their responsibilities as learners.

Student Learning Motivation

Learning motivation is a crucial and fundamental aspect of the educational process, as it serves as the primary driving force that fosters students' desire to achieve learning goals.

In the context of this research, motivation is understood as both internal and external forces that can motivate students to actively participate in learning activities.

Based on an interview with the sixth-grade homeroom teacher, Suryani, S.Pd.I, it was explained that learning motivation plays a strategic role in maintaining the continuity of students' learning processes. She stated that motivation functions as a driving force that fosters students' desire to learn. When students are motivated, they automatically develop a desire to achieve their goals. Therefore, teachers are required to provide engaging and innovative forms of motivation to maintain students' enthusiasm for learning.

Furthermore, Suryani, S.Pd.I., also emphasized that motivation is a factor that can drive someone to achieve a specific goal. In the context of learning, motivation must be awakened within each student to encourage them to learn. Without motivation, the learning process tends to be suboptimal because students lack the driving force to actively engage.

This view aligns with Mariam's opinion, which states that motivation is something that can inspire a child to achieve their goals. In this case, learning motivation is seen as a means of encouraging a child to have the desire to learn. She emphasized that without encouragement, whether in adults or children, a person tends to become lazy in carrying out activities, including learning.

From a teacher's perspective, the responsibility for increasing student learning motivation extends beyond providing learning materials to developing strategies that can foster enthusiasm for learning. This was echoed by Suryani, S.Pd.I., who explained that teachers must be intelligent in addressing student situations, one of which is through the implementation of engaging learning methods. An example is the formation of "gamer teams," a group-based learning model that emphasizes healthy competition among students. In this method, students are divided into several groups that compete to win. As a form of reinforcement, teachers provide rewards in the form of praise, stars, or other forms of appreciation. This strategy has been proven to increase student enthusiasm for learning, even in online learning environments that can potentially lead to boredom.

Furthermore, Suhaini, S.Pd.I., emphasized the role of teachers in providing motivation. She stated that motivation can be provided in various ways, such as instilling confidence in students' abilities, providing encouragement, and providing directed freedom. This freedom is not unlimited, but is accompanied by guidance regarding what is right and wrong, so students can learn to make independent decisions without feeling pressured.

On the other hand, the role of parents also plays a crucial role in increasing students' motivation to learn. Indah revealed that she always strives to support her child, one way of doing this is by praising him for his learning achievements. Although it doesn't always take the form of a reward, praise is considered to make children feel appreciated and more motivated to learn.

However, not all parents are able to provide optimal motivation. Warti stated that limited time due to work makes it difficult for her to pay attention to her children's learning activities. This leads to a lack of control and support for their children's learning process at home, potentially lowering their motivation.

From a student's perspective, motivation to learn emerges in various forms. One student, A, revealed that he feels motivated when his parents praise his learning achievements. This praise creates a sense of pride and encourages him to study harder. FZ echoed this sentiment, stating that parental encouragement to achieve is a major factor motivating him to study.

In contrast, AR revealed that the lack of parental guidance at home leads him to spend more time playing games. He acknowledged that his motivation to learn is more evident at school, especially when he receives appreciation from teachers, such as praise and awards. This demonstrates that a conducive and appreciative learning environment has a significant influence on student motivation.

Meanwhile, intrinsic motivation was also found in several students. NA stated that the drive to achieve his goals and the desire to make his parents happy are the main factors motivating him to study. This statement is reinforced by RA, who emphasized the importance of internal willpower and support from those closest to them in maintaining consistent learning.

Based on the overall research findings, it can be concluded that learning motivation is a key factor in the success of students' learning process. This motivation can come from within (intrinsic) or from external (extrinsic) sources, such as support from teachers and parents. Each student has unique characteristics, so the approach to providing motivation must be tailored to their individual needs. Therefore, synergy between teachers and parents is essential to creating a learning environment that encourages students to be more active, enthusiastic, and achieve in their studies.

The Impact of Digital Science Literacy on Students Addicted to Online Games

Digital science literacy is a crucial competency for navigating technological developments in the era of the Industrial Revolution 4.0. In the context of basic education, this literacy is not only related to the ability to use digital devices but also encompasses the ability to understand, analyze, and critically utilize information to support the learning process. In line with the "Freedom to Learn" program policy, digital literacy is one of the three basic literacies that students must possess.

Based on research at MIN 1 Central Aceh, it was found that students' digital science literacy levels were closely related to their online gaming behavior, particularly among students experiencing addiction. Data analysis indicates that digital science literacy can act as a strengthening or weakening factor in the impact of online gaming addiction, depending on how students utilize the technology in their daily lives.

This study used several qualitative indicators to measure students' digital science literacy, including the ability to search for and access digital information, the ability to sort information, the ability to organize digital data, and the ability to direct search activities. These four indicators serve as the basis for identifying the extent to which students are able to use technology effectively and productively.

a. Positive Impact of Digital Science Literacy

Research results show that students with a good level of digital science literacy tend to be able to manage technology use more wisely, even if they also play online games. This was revealed by Suryani, S.Pd.I, who stated that there is a clear difference between students who only use gadgets for gaming and those who are able to utilize technology as a learning tool.

Students with high digital science literacy exhibit several characteristics, including the ability to distinguish between valid and invalid information, use platforms such as search engines and learning videos to understand material, and possess better critical thinking skills. They also tend to be able to control themselves in their use of digital devices, so that gaming does not completely disrupt the learning process.

In an interview, Suryani, S.Pd.I., explained that students who are accustomed to being guided to use technology in their learning will find it easier to utilize the internet as a learning resource. This is usually supported by the active role of teachers at school and the attention of parents at home who provide guidance on technology use.

Furthermore, several students, such as NA and RA, also indicated that even though they play online games, they are still able to use digital devices to search for additional information related to their lessons. This suggests that digital science literacy can be a protective factor against the negative impacts of online gaming addiction.

b. Negative Impacts on Students with Low Digital Science Literacy

Conversely, students with low digital science literacy tend to use technology undirectedly. Based on interviews, students in this category primarily use gadgets for gaming and entertainment, without utilizing them for learning activities.

Suryani, S.Pd.I., revealed that students with low digital literacy generally fail to differentiate between learning and entertainment activities. They prioritize online gaming and tend to neglect schoolwork. This condition results in decreased academic achievement and poor critical thinking skills.

This is also evident in some students, such as AR, who focus more on gaming and less on utilizing technology for learning. Students in this category also tend to have difficulty finding relevant information, are unable to sort through digital content, and lack awareness that technology can be used to improve their academic performance.

Furthermore, limited digital science literacy also impacts students' poor ability to organize information and direct their search activities. They tend to be passive in using technology and simply follow habits dominated by gaming.

c. Digital Science Literacy as a Factor Directing Digital Behavior

This study confirms that digital science literacy plays a crucial role as a directing factor in students' technology use behavior. This literacy serves not only as a technical skill but also as a cognitive ability that helps students make informed decisions about using technology.

According to Suryani, S.Pd.I, students with good digital science literacy tend to be better able to optimize internet use for learning activities. They can utilize various digital resources such as articles, learning videos, and science simulations to more easily understand the material.

Furthermore, students can develop scientific thinking through the use of technology, such as the ability to analyze information, draw conclusions, and connect learned concepts. This demonstrates that digital science literacy can bridge the gap between technology use and improving the quality of learning.

DISCUSSION

The rapid development of digital technology in the last two decades has brought significant changes to the learning behavior patterns of students, especially among elementary school and madrasa students. (Radandi et al., 2023). One of the most prominent phenomena in this context is the increasing intensity of online gaming among children. Originally designed for entertainment and recreation, online games have now become an integral part of students' daily lives. However, despite their positive role in enhancing certain cognitive abilities, such as reflexes, strategic thinking, and online collaboration, they also have concerning negative impacts, particularly when gaming is done excessively and without control.

This discussion will comprehensively examine the relationship between online gaming addiction and motivation. Online gaming addiction is a form of behavioral dependence characterized by a compulsive urge to continue playing despite the negative impacts on an individual's social, academic, and emotional functioning. In the context of elementary education, online gaming addiction often directly impacts decreased learning motivation and a diminished interest in academic activities. This occurs because students derive satisfaction, rewards, and a sense of accomplishment from the virtual world, rather than from real-world learning achievements.

In addition to impacting learning motivation, this phenomenon also impacts digital science literacy, namely students' ability to understand, assess, and use technology-based information in a scientific context. When digital technology use is directed more toward entertainment than learning, students' digital science literacy skills can stagnate or even decline. Therefore, an in-depth evaluation is needed to determine how online gaming addiction affects these two crucial aspects: learning motivation and digital science literacy, especially in elementary education settings such as Madrasah Ibtidaiyah. This analysis not only focuses on the negative impacts, but also attempts to see the positive potential that may emerge if gaming activities are managed proportionally and directed to support technology-based learning.

Research at MIN 1 Aceh Tengah showed that students who frequently play online games, between 5 and 6 hours per day, tend to experience decreased learning motivation. They exhibit symptoms such as difficulty concentrating, decreased enthusiasm for lessons, and reduced interest in academic activities. This phenomenon is in line with the findings (Adhzani & Tirtoni, 2023) A study in the International Journal of Educational Management

and Development (IJEMD) found that elementary school students who played online games for more than 3–4 hours per day experienced a significant decrease in learning motivation. This research reinforces field findings that playing time is a key indicator of online game addiction, which negatively impacts children's academic motivation. Furthermore, (Andr et al., 2020) stated that game duration is not as strong as the intensity of digital interaction (online chatting) in predicting problem and addictive gaming, where internet use exceeding four hours per day significantly increases the risk of addiction.

In addition to duration, decreased learning motivation can also be explained by psychological aspects related to achievement emotions. Research by (Amriza et al., 2024) from *Research and Practice in Technology Enhanced Learning (RPTEL)* found that online game addiction not only reduces learning motivation but also affects students' sense of achievement. Addicted students tend to derive satisfaction and pride from success in the virtual world, rather than from academic success in the real world. This explains the phenomenon at MIN 1 Aceh Tengah , where students are more enthusiastic about discussing their game wins than their academic achievements. In the context of Self-Determination theory, (Deci & Ryan, 2000), Students' intrinsic motivation shifts from learning to play, as online games can provide a sense of competence and reward more quickly and are emotionally engaging. In the context of MIN 1 Aceh Tengah, teachers and parents reported that students who had difficulty managing their time and were unable to control their emotional urges to play games experienced the greatest decline in learning concentration. Therefore, the results of this study demonstrate the importance of developing self-regulation skills and providing emotional support from parents as a preventative measure against the negative impacts of online gaming.

From a broader academic perspective, these findings align with a systematic review. (Alzahrani & Griffiths, 2025) reviewed 27 international studies on the relationship between problematic gaming and academic performance. The majority of studies (24 out of 27) showed that gaming addiction negatively impacts academic achievement, either through decreased grades or academic motivation. This strengthens the conclusion that online gaming addiction not only affects learning behavior but also has the potential to reduce students' overall academic achievement. However, Alzahrani and Griffiths also note that this impact varies depending on levels of self-control, family support, and age context, making it an important consideration for further research in elementary school settings such as MIN 1 Aceh Tengah.

Overall, the findings of this study indicate that the relationship between online gaming addiction and students' learning motivation is complex and multidimensional. Playing duration, emotional regulation, self-control, and parental supervision play important roles in determining the extent to which online gaming affects learning motivation. When self-control and a supportive learning environment are low, online gaming addiction poses a serious threat to academic enthusiasm and achievement. Conversely, with proper guidance and strong self-regulation skills, gaming can be directed towards positive cognitive and social development. Therefore, the results of this study support the conclusions of various recent studies that efforts to prevent online game addiction must involve collaboration between teachers, parents, and students to build digital discipline and foster intrinsic motivation in learning.

1. The Influence of Learning Motivation on Students Addicted to Online Games

Based on observations and interviews with teachers, parents, and students at MIN 1 Aceh Tengah, researchers found that learning motivation has a significant influence on the behavior and impact of online gaming addiction in students. Field data analysis shows that differences in learning motivation levels determine whether online gaming addiction has negative effects or can be minimized through good self-regulation. Online gaming addiction in adolescents is influenced by a combination of individual, family, and environmental factors, including cognitive distortions, low life satisfaction, duration of smartphone use, parenting and communication patterns, and the school social climate and peer relationships. Preventive approaches need to be multidimensional and involve families and educational institutions. (Nursalam et al., 2023).

a. Students with High Learning Motivation

The study revealed that students with high learning motivation were able to maintain their academic performance despite frequently playing online games. They continued to complete assignments, managed their time, and were not significantly affected by gaming. Strong intrinsic motivation enabled them to resist the urge to play excessively.

A sixth-grade teacher, Ms. Umi, explained that students with strong academic abilities typically have self-control, so gaming doesn't diminish their learning motivation. This is evident in her statement: "Smart children can control themselves, so they know when to study and when to play, which keeps their learning motivation high."

This suggests that high learning motivation serves as a behavioral regulator, so the effects of online gaming addiction are not significantly apparent in this group of students.

b. Students with Low Learning Motivation

Further analysis shows that students with low learning motivation are highly susceptible to the negative impacts of online gaming addiction. They have difficulty managing their time, tend to neglect schoolwork, and show a declining interest in learning. Gaming activities become a top priority, while studying becomes a postponed or even neglected activity.

Teachers and parents consistently report this phenomenon. As stated by Mrs. Umi:

"Students who are less intelligent and have low motivation have difficulty controlling themselves. They use their study time to play, so their motivation decreases even more."

Parents like Mrs. Sholatiyah also corroborate this finding through complaints that their children prefer playing on their phones to studying, despite repeated reminders. This data confirms that low learning motivation exacerbates the impact of online gaming addiction, as children lack the drive to balance playing and studying.

c. Learning Motivation as a Factor Controlling the Impact of Online Gaming Addiction

From various interviews, it can be concluded that learning motivation acts as a protective factor for students. Children with high motivation are able to:

1) Control their playing time,
2) Complete assignments on time,
3) Understand learning priorities,
4) Maintain their academic performance despite frequent gaming.

Meanwhile, children with low motivation tend to:

1) Excessively play games,
2) Neglect study obligations,
3) Experience a decline in academic performance,
4) Lose interest in academic activities.

In other words, learning motivation determines the extent of the impact of online gaming habits.

d. The Influence of Environment and Parental Control on Motivation

The analysis also found that learning motivation is significantly influenced by parental support. Children who receive attention, guidance, and support from their parents

demonstrate more stable learning motivation, preventing negative consequences for online gaming addiction.

As Mrs. Indah stated:

"If we control and motivate children well, they can manage their time, so even when they play games, they still achieve."

Conversely, children who lack family control and encouragement to learn show decreased motivation and irregular game use. The family's role is not limited to limiting playtime but also requires monitoring playing patterns and behaviors that lead to addiction. (Nurmagandi et al., 2025). According to (Akbar & Hasrullah, 2025), Recommendation systems on gaming platforms should not only serve to increase user engagement, but also be designed to detect unhealthy playing patterns and provide suggestions for alternative time management and activities to maintain users' mental health and behavioral balance.

2. The Influence of Digital Science Literacy on Students Addicted to Online Games

Digital literacy is one of the three basic literacies that are the focus of the "Independent Learning" program policy, transforming the education system to meet the needs of the industrial revolution 4.0 era. (Widiyono & Millati, 2021). Most adolescent gamers experience moderate levels of addiction, and there is a significant relationship between online gaming addiction and depression, with the risk of depression increasing approximately threefold in addicted adolescents. This demonstrates the importance of strengthening digital science literacy so students can critically understand the impact of technology use, manage gaming behavior, and make informed decisions to maintain their psychological health. (Nurmagandi et al., 2025).

Data analysis shows that digital science literacy can either strengthen or weaken the impact of online gaming addiction, depending on how students utilize the technology.

a. Positive Impacts of Digital Science Literacy

Students with higher digital science literacy were found to:

• Be able to distinguish between valid and invalid information from the internet,
• Use learning videos, science simulations, or scientific articles to understand science material,
• Have better critical thinking skills,
• Be able to control themselves when using digital devices.

Thus, even when playing online games, they can still utilize technology for learning, thereby mitigating the negative impacts of gaming addiction. Students in this group are

usually supported by more concerned parents or teachers who actively guide the use of digital technology at school. The development of a multimedia-based Science Digital Library, according to (Prastiti & Adi, 2024) Designed using the ADDIE approach, it has proven to be highly valid, practical, and effective in improving elementary school students' scientific literacy, with a high increase in the N-gain score. Children are free and flexible to develop their acquired knowledge through practice, experiments, and discussions with their peers (Anggreni et al., 2022).

b. Negative Impacts on Students with Low Digital Science Literacy

Conversely, students with low digital science literacy experience much stronger impacts of online gaming addiction, such as:

- Inability to find relevant information for learning,
- Using gadgets only for entertainment and games,
- Not understanding that technology can be used to improve academic performance,
- Difficulty focusing and being less critical in evaluating digital content.

This reinforces the findings of interviews with several teachers that students with low self-control and limited digital literacy tend to experience decreased academic performance due to uncontrolled gadget use. A sixth-grade teacher revealed that these children typically "make gaming their top priority and are unable to differentiate between learning and entertainment activities."

c. Digital Science Literacy as a Factor Influencing Digital Behavior

This study confirms that digital science literacy serves as a guiding factor for students addicted to online gaming. Digital science literacy helps students:

- Optimize internet use for learning,
- Utilize digital educational content,
- Understand scientific phenomena more easily through audio-visual resources,
- Develop a scientific mindset even when using gadgets to play.

Thus, students who are addicted to games but have good digital science literacy can still achieve high academic results because they are trained to use technology more wisely.

d. Key Findings: Game Addiction Doesn't Always Hinder Digital Science Literacy

Field findings also reveal an interesting fact: Not all students addicted to online games have low digital science literacy. In some cases, game addiction actually makes students:

1) More familiar with technology,

2) More accustomed to reading digital instructions,
3) More trained in strategizing (basic scientific logic),
4) More interested in trying other digital platforms.

Such students can quickly grasp the use of Google, YouTube, or other educational apps. However, their effectiveness still depends on:
1) self-control,
2) teacher guidance,
3) and parental guidance.

CONCLUSION

Based on research findings at MIN 1 Central Aceh, it can be concluded that online game addiction significantly impacts students' learning motivation. Students experiencing addiction, such as AR, NA, and RA, tend to exhibit decreased learning motivation, characterized by a lack of concentration, low interest in learning, and a tendency to neglect academic tasks. However, this influence is not absolute, as students with high learning motivation, such as A and FZ, are still able to control themselves and balance play and learning activities. Therefore, the level of learning motivation and self-control are important factors in determining the extent to which online game addiction affects students' learning behavior.

Furthermore, online game addiction also impacts students' digital science literacy, albeit with more complex characteristics. Students with good digital science literacy are able to utilize technology not only for play but also to support learning, thus minimizing the negative impacts of addiction. Conversely, students with low literacy tend to use digital devices solely for entertainment and experience difficulty searching for, sorting, and critically utilizing information. Interestingly, in some cases, online gaming addiction can actually improve basic digital skills, such as understanding technology and strategic thinking, although this still depends on the guidance of teachers like Suryani, S.Pd.I., and parental supervision. Therefore, digital science literacy plays a key role in determining whether online gaming addiction has negative impacts or can be channeled into more productive opportunities.

REFERENCES

Adhzani, F. N., & Tirtoni, F. (2023). The impact of online games on learning motivation of elementary school students: Dampak Game Online terhadap Motivasi Belajar Siswa

Sekolah Dasar. *Indonesian Journal of Education Methods Development, 18*(3). https://doi.org/10.21070/ijemd.v21i3.768

Akbar, I. K., & Hasrullah, H. (2025). Jurnal Sistem Rekomendasi tentang Kecanduan Bermain Game Online. *Jurnal Global Ilmiah, 2*(4), 1–6. https://doi.org/10.55324/jgi.v2i4.178

Alzahrani, A. K. D., & Griffiths, M. D. (2025). Problematic gaming and students' academic performance: A systematic review. *International Journal of Mental Health and Addiction, 23*(5), 4062–4095. https://doi.org/10.1007/s11469-024-01338-5

Amriza, R. N. S., Husnaini, S. J., & Firmansyah, A. Y. (2024). Correlation among game addiction, achievement emotion, and learning motivation: A study of Indonesian youth in the context of e-learning system. *Research and Practice in Technology Enhanced Learning, 19*, Article 027. https://doi.org/10.58459/rptel.2024.19027

André, F., Broman, N., Håkansson, A., & Claesdotter-Knutsson, E. (2020). Gaming addiction, problematic gaming and engaged gaming: Prevalence and associated characteristics. *Addictive Behaviors Reports, 12*, Article 100324. https://doi.org/10.1016/j.abrep.2020.100324

Anggarani, F. K. (2015). Internet Gaming Disorder: Psikopatologi Budaya Modern. *Buletin Psikologi, 23*(1), 1–12. https://doi.org/10.22146/bpsi.10572

Anggreni, R. A., Antara, P. A., & Ujianti, P. R. (2022). Instrumen Literasi Sains pada Anak. *Jurnal Pendidikan Anak Usia Dini Undiksha, 10*(2), 291–301. https://doi.org/10.23887/paud.v10i2.49303

Haryati, H., & Purba, A. (2023). Pengembangan Model Asesmen Literasi Sains Berbasis Digital bagi Siswa Sekolah Menengah Pertama dalam Upaya Mendukung Gerakan Literasi Nasional. *Jurnal Bionatural, 10*(2), 124–135. https://doi.org/10.61290/bio.v10i2.731

Jap, T., Tiatri, S., Jaya, E. S., & Suteja, M. S. (2013). The development of Indonesian Online Game Addiction Questionnaire. *PLOS ONE, 8*(4), Article e61098. https://doi.org/10.1371/journal.pone.0061098

Moleong, L. J. (2017). *Metodologi Penelitian Kualitatif* (Edisi revisi). PT Remaja Rosdakarya.

Novrialdy, E. (2019). Kecanduan Game Online pada Remaja: Dampak dan Pencegahannya. *Buletin Psikologi, 27*(2), 148–158. https://doi.org/10.22146/buletinpsikologi.47402

Nurmagandi, B., Wabula, I., & Damayanti, R. (2025). The influence of online gaming addiction on depression in adolescents. *Indonesian Journal of Global Health Research, 7*(5), 23–32. https://doi.org/10.37287/ijghr.v7i5.5933

Nursalam, Iswanti, D. I., Agustiningsih, N., Rohmi, F., Permana, B., & Erwansyah, R. A. (2023). Factors contributing to online game addiction in adolescents: A systematic review. *International Journal of Public Health Science (IJPHS), 12*(4), 1763–1770. https://doi.org/10.11591/ijphs.v12i4.23260

OECD. (2019). *PISA 2018 assessment and analytical framework*. OECD Publishing. https://doi.org/10.1787/b25efab8-en

Prastiti, M. R., & Adi, B. S. (2024). Science Digital Library: Innovation in improving science literacy of elementary school students. *Jurnal Prima Edukasia, 12*(2), 216–227. https://doi.org/10.21831/jpe.v12i2.69478

Radandi, M. N. P., Salsabila, S., Dalina, D., Desrina, T. I., Nurrahman, S., & Delin, L. O. (2023). Pengaruh Kecanduan Game Online terhadap Keterampilan Sosial pada Remaja Gen Z. *Educate: Journal of Education and Learning, 1*(2), 74–80. https://doi.org/10.61994/educate.v1i2.121

Rahayu, I. S., Karana, I., Hardiansyah, M. A., Dewi, D. H., & Elihami, E. (2021). The relationship of online game addiction with learning motivation in school age children on COVID-19 pandemic. *Linguistics and Culture Review, 5*(1), 384–396. https://doi.org/10.21744/lingcure.v5n1.1650

Sari, A. S., Aprisilia, N., & Fitriani, Y. (2025). Teknik Pengumpulan Data dalam Penelitian Kualitatif: Observasi, Wawancara, dan Triangulasi. *Indonesian Research Journal on Education, 5*(4), 539–545. https://doi.org/10.31004/irje.v5i4.3011

Widiyono, A., & Millati, I. (2021). Peran Teknologi Pendidikan dalam Perspektif Merdeka Belajar di Era 4.0. *Journal of Education and Teaching (JET), 2*(1), 1–9. https://doi.org/10.51454/jet.v2i1.63