



Correlation between Emotional Intelligence and Online Gaming Addiction with Students' Mathematical Critical Thinking Ability

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ABSTRACT

The purpose of this study was to determine the relationship between emotional intelligence and mathematical critical thinking skills with online game addiction as a control variable. This study uses a quantitative approach with a survey design. This research is research using the partial correlation method. The population in this study were students of SMA Negeri 1 Cianjur. The subjects of this study were students of class XII IPS SMA Negeri 1 Cianjur in the 2022/2023 academic year who demonstrated tendencies of online gaming addiction. The sample in this study was 32 students of class XII-IPS SMA Negeri 1 Cianjur. The sampling technique was carried out by purposive sampling. The research instrument used was a test instrument to measure mathematical critical thinking skills and a questionnaire used to measure emotional intelligence and online game addiction. The data analysis technique used is a statistical test, namely a partial correlation test using the Smart-PLS application. A partial correlation analysis was conducted using Kendall's Tau coefficient. That is, there is no relationship between emotional intelligence and students' mathematical critical thinking skills with online game addiction as a control variable. The findings of this study imply that emotional intelligence and online gaming tendencies are significant variables that should be taken into account by educators, institutions, and researchers in efforts to enhance students' mathematical critical thinking ability and to inform subsequent scholarly inquiry.

Keywords: emotional intelligence, mathematical critical thinking ability, online game addiction.

INTRODUCTION

The digitalization resulting from the COVID-19 pandemic has significantly impacted various aspects of education, providing students with greater opportunities to operate digital devices. These devices are no longer used solely for learning purposes but have also extended into the realm of online gaming (Selegi, 2021). According to a report by Makki (2020) on CNN Indonesia, Verizon stated that online game usage surged by 75% during peak hours amid the COVID-19 pandemic. Uncontrolled gaming habits may lead to addiction. Suplig (2017) noted that online game addiction is most prevalent among adolescents, as they tend to seek sources of pleasure, with online games serving as one such outlet. This aligns with Gurusinga's (2020) findings that online game users are not limited to children but are predominantly adolescents, many of whom are secondary school students.

The tendency to engage in online gaming presents both positive and negative consequences. Negative impacts include time distortion, inattention, hyperactivity, violent behavior, negative emotions, aggressiveness, increased stress vulnerability, and socio-emotional disturbances that hinder self-control while gaming (Fitri et al., 2018; Lemmens

et al. in Gunawan & Ningsih, 2021). Yuan (in Hastuti et al., 2019) asserted that online game addiction influences adolescents' emotional development, largely because they devote significant time to gaming and struggle with self-regulation. Hence, adolescents need to possess the capacity to manage their emotions effectively—commonly referred to as emotional intelligence. Emotional intelligence enables individuals to recognize, understand, regulate, and utilize emotions constructively in daily life, helping them to distinguish right from wrong, manage moods, avoid excessive indulgence, and resolve conflicts (Hamid in Hastuti et al., 2019).

Despite these negative consequences, online gaming also offers potential benefits. According to Surbakti (2017), online games can enhance intelligence, improve concentration, sharpen vision, increase English proficiency, support social interaction, boost brain performance, increase typing speed, reduce stress, and aid physical recovery. Rasyid et al. (2020) further found that implementing mobile learning applications using RPG Maker MV can enhance students' critical thinking skills.

International assessments such as PISA have highlighted persistent challenges faced by Indonesian students, particularly in mathematics and emotional regulation, in the post-pandemic era (OECD, 2022; Rahmi et al., 2023; Septian et al., 2022). Indonesia ranked 69th out of 80 participating countries in overall performance. The report also noted that Indonesian students showed weak emotional control (ranked 55th out of 61 countries) and one of the weakest improvements in mathematical performance related to self-directed learning confidence (ranked 70th out of 73). These findings underscore the urgent need to strengthen both students' mathematical abilities and emotional self-regulation skills, especially in the aftermath of the COVID-19 pandemic. It is also necessary to redirect the habits acquired during the pandemic—such as excessive device use and gaming—toward more productive outcomes, such as enhancing students' mathematical critical thinking and emotional self-control.

Critical thinking ability is the ability to determine a decision logically and rationally (Inayah et al., 2021; Maulani et al., 2019; Situngkir et al., 2023). The ability to think critically is necessary for solving problems or finding solutions because it provides clearer directions in thinking, and working, and is more accurate in determining the interrelationships between objects (Saputra, 2020). Therefore, it is important to have the ability to think critically, especially to solve problems in everyday life. This is in line with the opinion of Mayasari et al. (2023) which states that critical thinking skills must be mastered by students so that students can solve problems well. Critical thinking skills include abilities in learning mathematics that is essential and need to be possessed by students (Butar Butar and Jailani, 2023).

In relation to online gaming, Imamuddin et al., (2019) found no significant relationship between online gaming and students' mathematical critical thinking skills. However, successful gamers often rely on critical and strategic thinking to make logical decisions and win games. According to Paul (in Fikri et al., 2018), critical thinking is best achieved through a balance of cognitive processes, dispositional attitudes, and emotional intelligence. Therefore, emotional intelligence, as a counter to the negative effects of game addiction, and mathematical critical thinking, as a possible benefit of gaming, are the two dimensions that this study seeks to examine.

The previous study conducted by Nurhayati et al. (2021) has the results of emotional intelligence related to critical thinking skills with a correlated coefficient of 0.411, which means it has a moderate relationship category. Meanwhile, there is a similar study by Fikri et al. (2018) has the result that there is a positive relationship between emotional intelligence and students' mathematical critical thinking abilities.

Based on this background, the researcher conducted a study titled "The Relationship between Emotional Intelligence and Online Game Addiction with Students' Mathematical Critical Thinking Skills." The purpose of this study is to examine the relationship between emotional intelligence and mathematical critical thinking, using online game addiction as a control variable. Unlike previous studies, the novelty of this research lies in its statistical control of online game addiction, thereby allowing for a more natural and unbiased exploration of the relationship between emotional intelligence and mathematical critical thinking.

Despite several studies examining pairwise relationships among these variables, no research to date has investigated how emotional intelligence relates to mathematical critical thinking when the influence of online gaming addiction is statistically controlled. While prior studies have examined the relationship between online game addiction and emotional intelligence, as well as between emotional intelligence and mathematical critical thinking, no research has yet explored the combined influence of all three variables on students' mathematical critical thinking abilities. This study's novelty lies in examining the combined influence of emotional intelligence, online gaming addiction, and mathematical critical thinking, while controlling for the effect of gaming addiction. This approach offers a more nuanced understanding of how emotional intelligence impacts students' mathematical critical thinking abilities, unconfounded by the potential influence of gaming addiction.

RESEARCH METHODS

This study uses a quantitative approach with a survey design. This research is research using the partial correlation method. The purpose of this study is to determine the relationship between interrelated variables. These interrelated variables are the independent variable or independent variable (X), namely emotional intelligence; and the dependent variable (Y), namely the ability to think critically mathematically, through the control variable (Z), namely online game addiction.

The population in this study were students of SMA Negeri 1 Cianjur. The sample in this study was 32 students of class XII-IPS SMA Negeri 1 Cianjur. The sampling technique was carried out by purposive sampling. This research employed a purposive sampling method to select students of class XII-IPS SMA Negeri 1 Cianjur who demonstrate a propensity for online gaming. By targeting this specific population, the research aims to explore the correlations between emotional intelligence and online gaming addiction with students' mathematical critical thinking abilities in a context that is highly pertinent to the research questions. A key limitation of this research is the small sample size of 32, which may restrict the generalizability of the findings, diminish statistical power, and limit the scope of analytical approaches.

The research instrument used was a test instrument to measure mathematical critical thinking skills and a questionnaire used to measure emotional intelligence and online game addiction. The research instrument included a test with three items on number sequences and series. The validity and reliability of the test were assessed using the Anates V4 application. The validity test yielded a correlation coefficient of 0.77, which corresponds to high interpretation according to the Pearson Product Moment correlation interval of $0.70 \leq r_{xy} < 0.90$. Additionally, the reliability test resulted in a coefficient of 0.87, indicating high reliability based on the criteria for reliability coefficients ($0.70 \leq r_{xy} < 0.90$). The emotional intelligence questionnaire utilized 30 items sourced from Goleman's emotional intelligence assessment by The British School of Excellence (BSE), while the online gaming addiction questionnaire consisted of 9 items derived from Game Quitters.

The data analysis technique used is a statistical test, namely a partial correlation test using the Smart-PLS application. The partial correlation test that is carried out is the Kendall's Tau test because the data from the questionnaire is ordinal so it does not go through an assumption test and uses a non-parametric test. The research hypothesis is as follows.

H₀: $\rho=0$ (there is no correlation)

H₁: $\rho \neq 0$ (there is a correlation)

With the criteria for rejecting H₀ if the p-value <0.05.

RESULTS AND DISCUSSION

In this study, emotional intelligence is the independent variable or independent variable, mathematical critical thinking ability is the dependent variable or dependent variable and online game addiction is the control variable. The statistical test that was carried out was a partial correlation test that was carried out with the help of the Smart-PLS application with the following hypothesis.

H₀: $\rho=0$ (there is no correlation)

H₁: $\rho \neq 0$ (there is a correlation)

With the criteria for rejecting H₀ if the p-value <0.05.

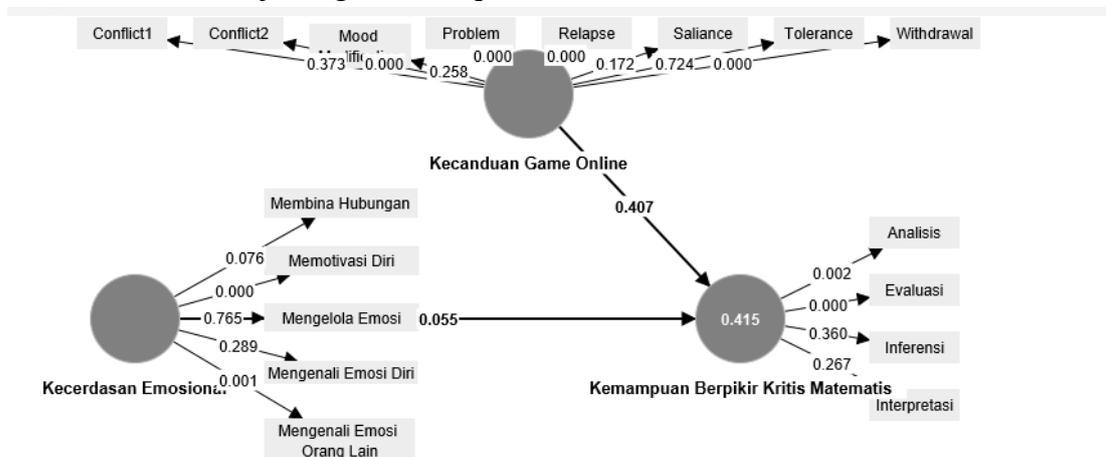


Figure 1. Test results through the Smart-PLS application

Based on Figure 1, the result is that the p-value is more than 0.05, which is 0.415, then h_0 is accepted. So, there is no correlation between emotional intelligence and students' mathematical critical thinking skills with online game addiction as a control variable. The p-value for emotional intelligence and critical thinking skills partially is 0.055 or more than 0.05, which means it is insignificant. Likewise, the p-value for online game addiction with partial mathematical critical thinking ability is 0.407 or more than 0.05, which is also insignificant. So, there is no relationship between emotional intelligence and critical thinking skills or between online game addiction and critical thinking skills.

The results of this study show that there is no relationship between emotional intelligence and mathematical critical thinking skills with online game addiction as a control variable at SMA Negeri 1 Cianjur. Then, this study viewed the relationship between emotional intelligence and students' mathematical critical thinking skills directly without online game addiction as a control variable showing that there is no relationship between the two. Then, online game addiction as a control variable is aimed at minimizing or eliminating other influences besides the independent variables or independent variables that can influence the results.

Opposite to the research conducted by Imamuddin et al. (2019) which found that there is a relationship between online games and critical thinking skills. Even so, the relationship is not significant and classified as very low. The average mathematical critical thinking ability of the participants in this study was superb. This superb criterion reflects that students have high-level mathematical critical thinking skills.

In addition, the average online game addiction among Cianjur 1 Public High School students who showed online game users who had fewer problems also showed an addiction rate that was not high. In other words, participants are not so addicted to playing online games. In fact, out of 32 participants, 5 participants admitted that they were not online game players, 8 participants admitted that they had only played online games and 4 participants were unsure about calling themselves online game players. The average length of time the participants played was 2.1 hours per day. From these results, it can be assumed that whether the participants have high or low addiction, the critical thinking skills of the participants are still very high. This is caused by the absence of a significant relationship because some of the participants in it are not players, let alone online game addicts.

In the dependent variable, namely emotional intelligence, two indicators have a significant relationship with this variable, namely self-motivation and recognizing other people's emotions. Even so, both of these indicators have criteria that still require improvement. In the dependent variable, the ability to think critically mathematically, two indicators have a significant relationship with this variable, namely the analysis and evaluation indicators. Both of these indicators have superb criteria. Then, on the control variable, namely online game addiction, there are four questions on certain indicators that have a significant relationship to this variable, such as the conflict indicator in the second question, problem, relapse, and withdrawal. On the four questions, the indicator shows online game users who have fewer problems.

According to Nurhayati et al. (2021), students' emotional intelligence will provide an overview of students' critical thinking skills in solving problems and increasing their critical thinking skills in managing their emotions when participating in the learning

process. So, it is crucial to research and analyze the relationship between emotional intelligence and critical thinking skills. Students with a positive mood will concentrate more on learning and this can support their critical thinking skills.

The ability to think critically can be influenced by several factors, one of which is a person's ability to manage emotions or what is commonly referred to as emotional intelligence. The better the emotional intelligence, the higher the critical thinking ability possessed by that person. Inside the school there are a lot of interactions during teaching and learning activities take place. This interaction will involve one's emotions and also one's motivation in learning so that it can affect one's critical thinking skills. Emotional intelligence will optimize students' critical thinking skills.

In a study conducted by Defi et al. (2021) emotional intelligence and one's epistemological beliefs has a relationship with the mastery of mathematical concepts. Mastery of this concept relates to the knowledge possessed by individuals. All forms of critical thinking cannot be done without the main component, namely knowledge (Ramdani et al., 2020). In addition, vice versa, in mastering good concepts, critical thinking skills are needed in working on problems that require analytical power and logical thinking (Nurazizah and Nurjaman, 2018).

According to Chabeli in Fikri et al. (2018), there is a close relationship between emotional intelligence and critical thinking in which critical thinking provides the mental tools needed to understand explicitly how reasoning works and how these tools can be used to take command of what to think, feel, desire and what to do. In line with this, Brookfield stated that emotion is central to critical thinking.

Meanwhile, the relationship between emotional intelligence and online game addiction lies in the impact caused by frequent online game-playing behavior. According to Misnawati (2016), online game addiction can affect the social aspects of addicts, such as mindset, self-image, and personality. The sum of time spent in the virtual world reduces the time spent in the real world, so the interaction with the people around them also decreases. This in turn causes social transitions in individual relationships with other humans.

Then, according to Amran et al. (2020), online game addiction can affect emotions. Those are both positive and negative emotions. Positive emotions are shown as the emergence of pleasure in oneself because one enjoys playing games or winning challenges, relieving stress due to family conflicts, and other things. Meanwhile, negative emotions are shown by withdrawing from social interaction, being insensitive to the environment, and even forming an asocial personality, so addicts cannot adapt to their surroundings.

There are also negative behaviors that arise as a result of playing online games as arguing with parents, aggressive attacks on peers, development of assertiveness, aggressive behavior due to distractions while playing, social views due to imitating characters shown in games, and often anger. Other negative behaviors are also displayed when playing games such as feeling annoyed and emotional when you lose, talking dirty and rude, or being annoyed because your internet quota has run out or the signal is bad (Wulandari and Sartika, 2022).

On the other hand, the relationship between online game addiction and mathematical critical thinking skills related to the mindset formed in the habit of playing.

Budiman and Sukamto (2022) explain that creativity and critical thinking are needed in completing every step of the game in online games, especially to reach a higher level. Complex games also require foresight, persistence, and patience to be completed. This in turn can have a positive influence on the critical thinking skills of the players, especially in designing strategies and thinking techniques needed to solve a problem.

Critical thinking skills also need to be facilitated through media that are interesting, fun, and contain problems that can hone thinking power. Media that is usable in learning is games. The link between the application of the game and critical thinking skills is understanding the meaning presented through visuals, analyzing the problems that exist in the game, evaluating while playing, to concluding and explaining the results of the game (Af'idah and Kustijono, 2020).

Addiction to online games can make it difficult for someone to regulate their emotions, its makes the person's emotional intelligence low. In other words, of course, someone who is addicted to online games will have low emotional intelligence which in turn is related to their low critical thinking skills as well.

However, as has also been mentioned, online games also have a good impact on influencing positive emotions, namely in channeling pleasure and relieving stress that is being lived. In addition, even though someone has a penchant for online games to be played continuously if that person has good emotional control, then that person can also be said to have high emotional intelligence. Critical thinking skills can also be trained by online games because they contain complex things that can build critical thinking patterns. In line with Sari et al. (2022) states that the positive impact of online games is that the brain will be more active in thinking, reflexes to respond increase, can express emotions, and be more creative and think more critically.

Based on this elaboration, the impact of online game addiction can make a person's emotional intelligence lower so it is further related to the ability to think critically about mathematics which will also be low. However, on the other hand, online game addiction in someone with virtuous emotional intelligence can construct their mathematical critical thinking skills also higher. It becomes ambivalent and causes the correlation between emotional intelligence and mathematical critical thinking ability with online game addiction to become erratic.

This was coupled with the results of the partial test which showed that there was no relationship, either between emotional intelligence and mathematical critical thinking skills or between online game addiction and mathematical critical thinking abilities. As a result, there is no significant relationship between emotional intelligence and critical thinking skills with online game addiction as a control variable.

Furthermore, the absence of a significant correlation may be influenced by other factors, such as socioeconomic status. The research subjects came from a top-tier school, with the majority belonging to middle- to upper-class backgrounds, which may have provided them with greater access to learning resources that enhance critical thinking skills, regardless of their online gaming habits. Additionally, it is possible that the relationship is non-linear and moderated by other variables, such as emotional intelligence. Students with high emotional intelligence may be better able to mitigate the negative effects of online gaming addiction on their critical thinking abilities. On the other hand, a

threshold effect may also exist, playing games for a certain amount of time might yield cognitive benefits, whereas excessive gaming could have detrimental consequences. These contradictions suggest that the relationship among the variables may be more complex than previously assumed, and thus, future research is encouraged to explore these dynamics more deeply.

CONCLUSION

This study shows that; there is no relationship between emotional intelligence and mathematical critical thinking skills with online game addiction as a control variable at SMA Negeri 1 Cianjur. Subjects or participants are very limited, both in terms of quantity and time in sampling. Therefore, the researcher recommends to the participant who wishes to conduct similar research or follow-up research on this research take more and broader subjects so it can be generalized. This research only examines whether or not there is a relationship between the existing variables without further examining the effect. In addition, this study also does not discuss the analysis of factors that cause the presence or absence of this relationship. Matters related to the influence and analysis of these factors can be the inspiration for those who wish to develop or continue similar research.

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