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The Influence of Quizizz Use, Digital Literacy, and Gender on Elementary School Students' Crearive Thinking Skills

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ABSTRACT

Creative thinking ability for students is very important in the era of global competition because the level of complexity of problems in all aspects of modern life is increasing. This thesis aims to analyze the effect of the use of quizizz, digital literacy, and gender on students' creative thinking ability. The method used is a quantitative method with multiple regression analysis with data collection through tests and questionnaires. The sample in this study was 60 students obtained from 2 selected classes with the condition of having almost the same average learning outcomes. The results of the study show that (1) The use of quizizz has a positive and significant effect on the creative thinking ability of grade VI students of SDN Jatipulo 03 Jakarta. The higher the level of student use of quizizz, the more students' creative thinking ability will increase. (2) Digital literacy has a positive and significant effect on the creative thinking ability of grade VI students of SDN Jatipulo 03 Jakarta. The higher the digital literacy, the more students' creative thinking ability will increase. (3) Gender does not have an effect on the creative thinking ability of grade VI students of SDN Jatipulo 03 Jakarta. (4) The use of Quizizz, digital literacy, and gender have a positive and significant influence simultaneously on the creative thinking abilities of class VI students at SDN Jatipulo 03 Jakarta.

Keywords: Quizizz Usage, Digital Literacy, Gender, Creative Thinking Skills

INTRODUCTION

As time progresses and science and technology advances, future challenges will continue to change, and competition will intensify. Indonesia is now entering the 21st century of education and the Industrial Revolution 4.0, and even moving towards Society 5.0. This is marked by rapid developments in internet technology. Addressing these challenges requires balanced development with robust competencies and skills, one of which is creative thinking.

Creative thinking is the entire series of cognitive activities used by individuals according to objects, specific conditions, and problems as an effort to solve problems based on individual capacity (Birgirli, 2015). Guilford (1973) views creative thinking as a type of divergent thinking. Guilford (1973) further proposed two ways of thinking: convergent and divergent thinking. Convergent thinking is the way individuals think about something with the view that there is only one correct answer. Meanwhile, divergent thinking is the ability of individuals to seek various alternative answers to problems.

Creative thinking in education in Indonesia is the goal of national education as stated in Law Number 20 of 2003 Article 3 which states that: "National education functions to develop abilities and shape the character and civilization of a dignified nation in order to enlighten the life of the nation, aiming to develop the potential of students to become human beings who believe in and fear God Almighty, have noble morals, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens."

The ability to think creatively is considered one of the Graduate Competency Standards (SKL) that has been stipulated in the Regulation of the Minister of Education and Culture (Permendikbud) number 20 of 2016, namely having the skills to think and act creatively, productively, critically, independently, collaboratively and communicatively.

Developing creative thinking has become a priority in education. In an era of global competition, creative thinking skills are crucial for students, as problems in every aspect of modern life become increasingly complex. Furthermore, creative thinking is classified as a high-level competency and can be considered a continuation of basic learning skills (Mursidik et al., 2015).

One characteristic of students with creative thinking skills is imagination, which refers to the ability to imagine unlimited possibilities, thus providing solutions or ideas beyond the average student's capabilities (Martzoukou et al., 2023). One way to foster students' imagination is by providing them with various learning media, including digital media (Helsper et al., 2020).

Classroom learning still largely emphasizes student understanding without engaging creative thinking skills (Siswono, 2018). This is compounded by students not being given the opportunity to find answers and methods different from those taught by their teachers. Furthermore, teachers' motivation and ability to foster students' creativity and creative thinking in the learning process are still lacking.

Nearly all subject areas still emphasize mastery of theory and memorization, leading to a decline in students' learning abilities. Learning methods that are too teacher-oriented tend to neglect the importance of fun, enjoyment, and intellectual development, resulting in suboptimal learning outcomes (Ardianto et al., 2022). Consequently, students are unable to develop their creative thinking skills to their full potential. Yet, teachers can utilize a variety of learning methods and media to foster students' creative thinking.

In the 21st century, social activities have been mediated through digital facilities such as email, newsgroups, message boards, internet telephony, chat rooms, instant messaging, and digital video conferencing, making digitally enabled communities a way of life. Not only are social communities thriving, but the internet also offers limitless information. Science and technology are developing so rapidly that they can impact all aspects of life. With the rapid development of information and communication technology (ICT) in this digital era, the competencies required are fundamentally different from those of previous eras (Delgado et al., 2018).

The use of technology in school learning activities can help students deepen their experience in solving learning problems quickly, easily, and enjoyably. Teachers facilitate students' use of technology in learning through fun exercises or assessments, such as using media such as applications or web tools, such as Quizizz.

The Quizizz app is a game-based educational application that brings multiplayer activities into the classroom and makes them interactive and fun (Eka & Nugraha, 2021). As an assessment tool, Quizizz has both advantages and disadvantages. The advantages of Quizizz include its accessibility anytime and anywhere with adequate internet access. Quizizz has a very attractive interface and is easy to create and play as a learning tool, further enhancing student attention and focus during learning (Eddy et al., 2020).

Citra and Rosy (2020) explain that Quizizz is a game-based educational application that brings multiplayer activities into the classroom and makes classroom learning more fun and interactive. Wibawa, Astuti, and Pangestu (2019) state that the Quizizz application has features that can generally facilitate teachers and students in the learning process. This indicates that the Quizizz application can be used for learning innovation. Afiani and Faradita (2019) state that the features in Quizizz can explore the basic abilities of students' creative thinking skills. Through Quizizz, it is also hoped that students will be more motivated to learn, maximize the development of students' academic abilities in high-level thinking, and play an important role in measuring students' learning concentration levels, by making learning evaluations in the Quizizz application optimally utilized (Yanmei et al., 2019).

One of the literacy skills that humans must master is digital literacy. Digital literacy can develop students' creative thinking skills (Nasrullah et al., 2017). Good digital literacy is necessary not only to take advantage of the digitalization of almost all aspects of life, but also to reduce exposure to risks and threats in everyday digital environments related to device protection, personal data protection and privacy, and health and well-being (Reichert et al., 2021). The current development of digital media and information technology presents challenges for users in accessing, selecting, and utilizing information. The ability to search for such information requires accuracy and quality of the information obtained by users. The importance of digital literacy needs to be instilled in students from an early age.

Digital literacy can utilize technology and information from digital devices effectively and efficiently in various contexts, such as academics, careers, and daily life (Chan et al., 2017). Digital literacy can create and share in various modes and forms to create, collaborate, and communicate more effectively, as well as understand how and when to use good digital technology to support these processes (Liu et al., 2020).

Digital literacy means being able to process various information in the form of messages and communicate effectively with others in various forms and understand when and how technology should be used to achieve goals effectively. Includes awareness and critical thinking about the various positive and negative impacts of technology in everyday life (Siriwatchana et al., 2018). Digital literacy is a person's knowledge and skills in using media, communication tools, or digital networks to search, evaluate, use, create information, and utilize it in a healthy, wise, intelligent, careful, appropriate, and lawful manner. foster communication and interaction in everyday life.

Indonesia's digital literacy index increased from 2020 to 2022, although this increase remained moderate. This indicates that Indonesian society's adoption of digitalization is increasing. In fact, a survey of sixth-grade students at Jatipulo 03 Elementary School in Jakarta revealed that many students still lacked understanding of the use of digital devices for learning at school. Digital literacy is not limited to the use of digital devices. It requires strong cognitive, sociological, and emotional skills in a digital environment. Many students still lack the ability to utilize digital media to facilitate their learning activities, both at home and at school.

Research on digital literacy often focuses not only on what it means to be digitally literate, but also on the impact on people of not being digitally literate. Concerns about lack of digital access have been replaced by concerns about 'digital illiteracy', namely the lack of skills, understanding, and practices necessary to successfully navigate the ever-changing digital landscape. The growing and expanding potential of information, learning, and communication technologies and new and emerging digital tools demands that any definition of digital literacy must be fluid and organic. Furthermore, what was once considered the 'school's responsibility' to prepare students to become digitally literate citizens is now the responsibility of all learning spaces, formal and informal (including homes and workplaces), to ensure the preparation and continuous updating of digital literacy skills, understanding,

and practices from an early age for everyone from toddlers to seniors. Given the urgency of digital literacy being promoted by the Government through the Ministry of Education, Culture, Research, and Technology, researchers are interested in analyzing students' digital literacy in an effort to improve creative thinking skills, one of the skills that children must possess today.

Kurnia, Sukarmin, and Sunarno (2021) presented several research findings on the influence of gender, including a comparison of creativity conducted by Munandar on high school students in Indonesia, which found that female creativity tends to be higher than male creativity, with a ratio of 58% to 42% (Munandar, 1997). Similar results were found by Aziz, whose research showed that in 82 children with high levels of creativity, more girls were compared to boys, with a ratio of 53% to 47% (Aziz, 2006). The results of the analysis of gender differences in creativity, both in creative thinking and creative writing skills, showed that girls tend to have higher levels of ability in both abilities compared to boys.

Meanwhile, Mulyono et al. (2020) explained that the results of a preliminary study also showed differences in students' creative thinking abilities based on gender, with female students having a higher average total score than male students. These results align with the research of Komara and Yulianto (2019) which stated that gender influences mathematics ability, with female students' average scores higher than male students'. On the other hand, Reilly, Neumann, and Andrews (2017) in their study examining TIMSS results revealed that male students outperform female students in many countries.

Many studies have been conducted on students' creative thinking skills. Current research is limited to the use of Quizizz and gender. Research on students' creative thinking skills related to digital literacy remains elusive. Therefore, researchers are interested in incorporating digital literacy into measuring students' creative thinking skills. Based on the description above, researchers are interested in conducting research on the influence of Quizizz use, digital literacy, and gender on students' creative thinking skills at SDN Jatipulo 03, West Jakarta.

RESEARCH METHOD

This research is a quantitative study with a multiple linear regression analysis design to analyze the effect of independent variables on the dependent variable both partially and simultaneously. The population referred to in this study is all sixth grade students of the odd semester of SDN Jatipulo 03 West Jakarta in the 2023/2024 academic year. The sample in this study used two classes, namely class VI A and class VI B SDN Jatipulo 03 West Jakarta, with the number of students in class VI A and VI B each being 30 students. So the number of samples in this study is 60 students.

Data in this study were collected through tests and non-tests. The test technique was used to collect data on students' creative thinking skills. Meanwhile, the non-test technique was used to collect data on digital literacy. The test to measure students' creative thinking skills consisted of three questions presented in video format. All three questions were written in essay format. The non-test to measure the ability to use Quizizz and digital literacy was a written questionnaire distributed via Google Forms. This questionnaire consisted of two parts: respondent demographics and statements involving the ability to use Quizizz and digital literacy.

The data analysis techniques used were (1) descriptive analysis of research variables, (2) analysis requirements test, and (3) inferential analysis. In the descriptive analysis of research variables, frequency distribution was used to describe the characteristics of respondents by processing them using Microsoft Excel, while to obtain an overview of respondents' answers to the research variables, an average score was used. In the analysis requirements test, it was used to determine whether data analysis for hypothesis testing could be continued or not. The classical assumption test was used for requirements in the use of the analysis model. regression. A model regression must fulfilThe data must be normally distributed, free from multicollinearity and heteroscedasticity. Inferential analysis involves three stages: a correlation coefficient test to determine the relationship/correlation of the independent variable to the dependent variable. Then, a coefficient of determination test is used to measure the model's ability to apply variations in the dependent variable. Finally, a t-test is performed to determine the extent of the influence of one independent variable on the dependent variable, assuming that the other independent variables are constant.

RESULTS AND DISCUSSION

The research results presented in this article are based on descriptive statistical tests, analytical requirements tests, and hypothesis tests. The descriptive statistics described cover creative thinking skills, Quizziz usage, and digital literacy. The analytical requirements tests used included normality, multicollinearity, and heteroscedasticity tests. Finally, hypothesis testing was conducted using multiple linear regression equations, correlation and determination tests, and hypothesis testing.

Descriptive Statistics

Creative Thinking Skills

The creative thinking ability test administered to 60 students consisted of 15 items summarized in four dimensions. The average results of the students' creative thinking ability test can be seen in Table 1. Based on the measurement results, students' creative thinking abilities were generally in the moderately creative category. Students

demonstrated a fairly good ability to generate various ideas and view a problem from various perspectives. In addition, the ability to generate relatively original ideas was also evident, although it still needs to be improved. However, students' ability to develop, clarify, and elaborate ideas in detail was still relatively low compared to other dimensions. These findings indicate that students already have a fairly good foundation of creative thinking abilities, but still need learning that can encourage them to elaborate and enrich their ideas in more depth.

Table 1. Average Score of Students' Creative Thinking Ability

Dimensions	Average Score	Criteria
Flexible Thinking	61.67	Quite Creative
Thinking in Detail	49.58	Lack of creativity
Fluent Thinking	61.67	Quite Creative
Original Thinking	51.04	Quite Creative
Average Creative Thinking Ability	55.99	Quite Creative

Source: Data Processing Results (2024)

Using Quizziz

The use of Quizizz consists of three dimensions: ease of use, peer coaching, and technology engagement. A description of the variables of Quizizz usage can be seen in Table 2. Based on the description of students' answers to the use of Quizizz, in general, students gave positive responses. The ease of use dimension received the best rating, indicating that students felt Quizizz was easy to understand and use in the learning process. The mentoring or peer support dimension also received a positive response, indicating cooperation and mutual assistance during the use of Quizizz. Meanwhile, the technology engagement dimension received a relatively lower rating compared to the other dimensions, although it still showed a positive response. Overall, these results indicate that Quizizz was well received by students and was able to support the learning process through ease of use, social interaction, and the use of technology.

Table 2. Description of Average Answers for Using Quizizz

Dimensions	No Item	Average	
easy of use	1	4.43	4.12
	2	3.97	
	3	4.37	
	4	4.08	
	5	3.75	
peer coaching	6	4.02	4.07
	7	4.20	
	8	4.07	
	9	4.23	
	10	3.83	
technology engagement	11	4.22	3.83
	12	3.77	
	13	3.55	
	14	3.47	
	15	4.15	
Average			4.01

Digital Literacy

Digital literacy consists of the dimensions of access, ability, practice, and attitude. Descriptions of digital literacy variables are depicted in Table 3. Based on the description of students' answers regarding digital literacy, in general, the level of digital literacy of students is in the fairly good category. The ability to communicate and share digital content showed the most prominent results, indicating that students are accustomed to using digital media to interact and share information. The ability to find, access, and consume digital content also showed good results, although there are still several aspects that need to be improved. Meanwhile, the ability to create digital content obtained relatively lower results compared to other dimensions, thus indicating that students still need to strengthen skills in producing and developing digital content independently. Overall, these findings indicate that students

already have fairly good digital literacy skills, especially in the use and communication of digital information, but need to be encouraged to be more active in the digital content creation process.

Table 3. Average Description of Digital Literacy Answers

Dimensions	No Item	Average	
Discovering and consuming digital content	1	2.65	3.26
	2	3.33	
	3	3.38	
	4	3.38	
	5	3.30	
	6	3.33	
	7	3.43	
Creating digital content	8	3.07	3.25
	9	3.23	
	10	3.22	
	11	3.25	
	12	3.30	
Communicateor share digital content	13	3.30	3.34
	14	3.35	
	15	3.43	
	16	3.33	
	17	3.28	
Average			3.27

Source: Data Processing Results (2024)

Test Requirements Analysis

Normality Test

Based on the results of the normality test using the One-Sample Kolmogorov-Smirnov method (Table 4), a significance value greater than the significance level used in the study was obtained. These results indicate that the residual data is normally distributed, thus meeting the normality assumption in the regression model. Therefore, the research data is suitable for further analysis because there are no significant deviations from the normal distribution.

Table 4. Results of the Normality Test with One-sample Kolmogorov Smirnov

		Unstandardized Residual
N		60
Normal Parametersa,b	Mean	.0000000
	Standard Deviation	11.52220570
Most Extreme Differences	Absolute	.096
	Positive	.058
	Negative	-.096
Test Statistics		.096
Asymp. Sig. (2-tailed)		.200c,d

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

Source: Processed Data, SPSS Output (2024)

Multicollinearity Test

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Based on the results of the multicollinearity test (Table 5), all independent variables had tolerance values above the minimum limit and VIF values below the required maximum limit. These results indicate that there are no symptoms of multicollinearity among the independent variables in the research model. Therefore, the variables of Quizizz usage, digital literacy, and gender do not have a very strong relationship with each other. Therefore, each variable can be used to explain its influence on creative thinking skills effectively, and the regression model used meets the multicollinearity assumptions.

Table 5. Multicollinearity Test Results

Coefficientsa

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Using Quizizz	.915	1,093
	Digital Literacy	.921	1,086
	Gender	.983	1,017

a. Dependent Variable: Creative Thinking

Source: Processed Data, SPSS Output (2024)

Heteroscedasticity Test

Based on the scatterplot graph of the heteroscedasticity test results, it can be seen that the residual points are randomly distributed above and below the zero line on the Y-axis and do not form a specific pattern, such as a tapered, widened, or wavy pattern. The relatively random distribution of points indicates that the residual variance tends to be constant across various predicted values. Thus, it can be concluded that the regression model in this study does not experience symptoms of heteroscedasticity, so the assumption of homoscedasticity has been met and the regression model is suitable for further analysis.

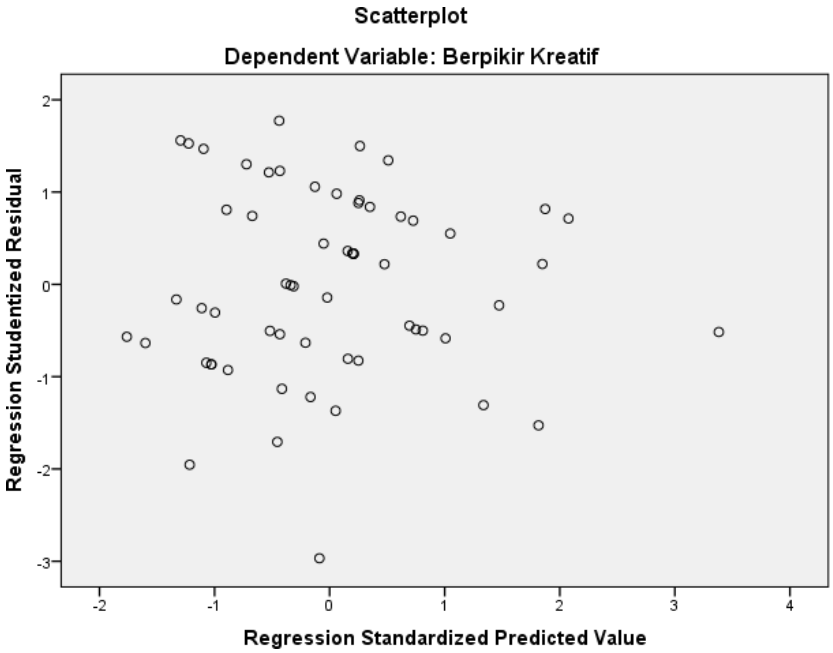

Figure 1. Heteroscedasticity Test

Source: Processed Data, SPSS Output (2024)

Hypothesis Testing

Multiple Linear Regression Equation

Based on the results of the regression coefficient test (Table 6), it was found that the use of Quizizz and digital literacy had a significant influence on students' creative thinking skills. This indicates that the better the use of Quizizz in learning and the higher the level of digital literacy of students, the more likely creative thinking skills are to increase. Between the two variables, digital literacy had a greater influence than the use of Quizizz. Meanwhile,

the gender variable did not show a significant influence on creative thinking skills. Thus, students' creative thinking skills are more influenced by the use of technology-based learning media and digital literacy levels than by gender differences.

Table 6. Results of Regression Coefficient Test
Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14,614	1,695		8,622	.000
	Using Quizizz	.146	.072	.263	2,043	.046
	Digital Literacy	.363	.126	.369	2,883	.006
	Gender	.421	.498	.105	.846	.401

a. Dependent Variable: Creative Thinking

Correlation and Determination Test

Based on the results of the correlation test and the coefficient of determination, it was found that the relationship between the use of Quizizz, digital literacy, and gender with creative thinking ability is in the moderate category. This indicates that the three independent variables together have a positive relationship with students' creative thinking ability. In addition, the results of the coefficient of determination indicate that creative thinking ability can be explained by the use of Quizizz, digital literacy, and gender in a relatively limited proportion, while most of the variation in creative thinking ability is influenced by other factors outside the research model that were not examined. Thus, although the model has the ability to explain variations in creative thinking ability, there are still other factors that play a more dominant role in influencing this ability.

Table 7. Results of Correlation Test and Determination Test
Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.493a	.154	.109	1.77969

a. Predictors: (Constant), Gender, Digital Literacy, Quizizz Use
Source: Processed Data, SPSS Output (2024)

Hypothesis Testing

Based on the t-test results, the variable of Quizizz usage has a positive and significant influence on students' creative thinking skills. This indicates that the use of Quizizz in the learning process can help improve creative thinking skills. The variable of digital literacy also has a positive and significant influence on creative thinking skills, indicating that students with a better level of digital literacy tend to have higher creative thinking skills. Meanwhile, the variable of gender does not have a significant influence on creative thinking skills, so gender differences are not a factor that determines the level of creative thinking skills of students. Thus, the use of Quizizz and digital literacy are factors that contribute to improving creative thinking skills, while gender does not show a significant influence.

Table 8. t-Test Results
Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14,614	1,695		8,622	.000
	Using Quizizz	.146	.072	.263	2,043	.046
	Digital Literacy	.363	.126	.369	2,883	.006
	Gender	.421	.498	.105	.846	.401

a. Dependent Variable: Creative Thinking

The Effect of Quizizz Use on Creative Thinking Skills

The results of the study indicate that the use of Quizizz has a positive and significant impact on students' creative thinking skills. This finding indicates that the more optimal the use of Quizizz in the learning process, the higher the students' creative thinking skills. This positive influence indicates that Quizizz not only functions as a learning evaluation tool but also creates a more interactive, engaging, and challenging learning experience, encouraging students to think more actively in solving various problems presented.

Quizizz offers various features, such as immediate feedback, an engaging interface, and gamification, that can boost students' motivation to learn. This allows students to be more engaged in the learning process and encouraged to explore various alternative answers. Through these activities, creative thinking skills such as fluency, flexibility, originality, and the ability to develop ideas are further stimulated.

Furthermore, using Quizizz also provides students with the opportunity to learn independently and have a fun learning experience. When students feel comfortable and motivated during learning, they tend to be more confident in expressing ideas, trying new strategies, and finding various solutions to complete learning tasks. Therefore, using Quizizz can be an effective alternative learning medium to support the development of students' creative thinking skills.

The Influence of Digital Literacy on Creative Thinking Skills

The research results show that digital literacy has a positive and significant impact on students' creative thinking skills. This finding suggests that the better students' ability to access, understand, evaluate, and utilize digital information, the higher their creative thinking skills. Digital literacy provides students with the opportunity to obtain information from various sources, compare different perspectives, and develop new ideas based on the information they obtain.

The results of this study align with those of Astalini et al. (2022) and Kesici (2022), which stated that digital literacy has a positive and significant effect on creative thinking skills. These findings also support the research of Rizal et al. (2021), which explains that creative thinking skills can be developed through improving students' digital literacy. In other words, the ability to utilize technology effectively not only supports the learning process but also contributes to the development of higher-order thinking skills.

Tabieh et al. (2021) stated that the application of digital literacy can help students develop creative thinking skills, including fluency, flexibility, and originality. Based on the characteristics of the respondents, most students are familiar with digital technology and its uses in everyday life. This indicates that the use of digital technology in the school environment is quite good. However, the use of this technology still needs to be optimized so that it is not only used for entertainment or communication, but also as a medium for developing creative thinking skills through learning activities.

Descriptive results indicate that students' creative thinking skills are in the moderately creative category. The detailed thinking dimension achieved the lowest achievement, indicating that students still experience difficulties in developing and expanding ideas in greater detail. Conversely, the flexible thinking dimension achieved the highest achievement, indicating that students are quite capable of generating various alternative answers to solve a problem. These findings indicate that improving digital literacy has the potential to help students enrich information, broaden their horizons, and develop ideas more deeply, thus optimally improving their creative thinking skills.

Digital literacy is not only about the ability to use technology, but also encompasses critical thinking, creativity, and problem-solving skills in digital environments (Goodfellow, 2011). Therefore, strengthening digital literacy needs to be a priority in the learning process so that students can utilize technology productively to develop their creativity.

The Influence of Gender on Creative Thinking Ability

The results of the study showed that gender did not significantly influence students' creative thinking skills. This finding indicates that creative thinking skills are not determined by gender differences, but rather are influenced by other factors such as learning experiences, the educational environment, learning motivation, technology use, and the opportunities provided to students to develop their creativity.

The results of this study reinforce the findings of Astra et al. (2022) and Suprapto et al. (2018), which stated that gender does not influence students' creative thinking skills. These findings indicate that both male and female students have equal opportunities to develop creative thinking skills if they receive supportive experiences and a supportive learning environment.

However, the results of this study differ from those of Matud et al. (2007) and Amir (2013), who found differences in creative thinking abilities based on gender. These differences in results may be due to sample characteristics, educational level, social environment, and the learning approach used in each study. Matud et al. (2007) also explained that gender differences in creative thinking tend to be small and are highly dependent on the educational context.

Based on the findings of this study, it can be concluded that developing creative thinking skills needs to focus on providing quality learning experiences for all students, regardless of gender. This way, every student has an equal opportunity to optimally develop their creative potential.

The Effect of Simultaneous Use of Quizizz, Digital Literacy, and Gender on Creative Thinking Ability

The research results show that the use of Quizizz, digital literacy, and gender simultaneously influence students' creative thinking skills. These findings demonstrate that creative thinking skills are not influenced by a single factor, but rather result from the interaction of various factors that support each other in the learning process.

Of the three variables studied, Quizizz use and digital literacy were shown to significantly contribute to creative thinking skills, while gender showed no significant partial effect. This indicates that factors related to technology utilization and digital information management skills play a greater role in improving creative thinking skills than the demographic factor of gender.

However, the coefficient of determination results indicate that the model's ability to explain variations in creative thinking ability is still relatively limited. This means that there are still other factors outside the research that influence students' creative thinking abilities, such as learning motivation, family environment, teacher-implemented learning strategies, critical thinking skills, individual creativity, and support from learning facilities and infrastructure.

Overall, the results of this study confirm that the integration of learning technology through Quizizz, supported by strong digital literacy skills, can be a crucial factor in developing students' creative thinking skills. Therefore, schools and teachers need to continue optimizing the use of learning technology and improving students' digital literacy so that the learning process can foster creativity more effectively.

CONCLUSIONS

Based on the research results, it can be concluded that students' creative thinking skills are in the moderately creative category. The use of Quizizz and digital literacy have been shown to have a positive and significant effect on students' creative thinking skills, indicating that the better the use of Quizizz in learning and the higher the students' digital literacy, the higher their creative thinking skills. Between the two variables, digital literacy has a more dominant influence on creative thinking skills. Meanwhile, gender does not have a significant effect on creative thinking skills, so gender differences are not a factor determining the level of student creativity. Together, the use of Quizizz, digital literacy, and gender influence creative thinking skills, although their contribution in explaining variations in creative thinking skills is still relatively limited. Therefore, increasing the use of technology-based learning media and strengthening digital literacy needs to be continuously carried out to support the development of students' creative thinking skills.

REFERENCES

Afiani, K., & Faradita, M. (2019). The use of the Quizizz application to improve the learning outcomes of PGSD students during the COVID-19 pandemic. Online Journal of Muhammadiyah University of Surabaya, 209–218.

Amir, ZA (2013). Gender perspective in mathematics learning. Marwah: Journal of Women, Religion and Gender, 12(1), 15.https://doi.org/10.24014/marwah.v12i1.511

Ardianto, R., Prasetya, MI, Army, WL, Kusumarini, E., & Pratiwi, EYR (2022). Analysis of the use of the Quizizz application in learning evaluation using the media system dependency method and technology acceptance model. Scientific Journal of Computer Informatics, 27(2), 177–193.https://doi.org/10.35760/ik.2022.v27i2.6797

Astalini, A., Darmaji, D., Kurniawan, DA, & Minarsih, M. (2022). Identification of HOTS creative thinking, science process skills and digital literacy in physics subject. Journal of Physics Research and Applications (JPFA), 12(1), 47–61.https://doi.org/10.26740/jpfa.v12n1.p47-61

Astra, RRS, Vilela, A., Pereira, J., & Zou, S. (2022). The influence of gender on the creative thinking abilities of junior high school students who have received the RME approach. Journal of Innovative Mathematics Learning, 5(1), 307–316.https://doi.org/10.22460/jpmi.v5i1.307-316

Birgili, B. (2015). Creative and critical thinking skills in problem-based learning environments. Journal of Gifted Education and Creativity, 2(2), 71–80.https://doi.org/10.18200/jgedc.2015214253

Cahyani, AC, & Rosy, B. (2020). The effectiveness of using Quizizz educational game-based learning media on office technology learning outcomes of class X students at SMK Ketintang Surabaya. Journal of Office Administration Education, 8(2).

Chan, B. S. K., Churchill, D., & Chiu, TKF (2017). Digital literacy learning in higher education through digital storytelling approach. Journal of International Education Research, 13(1), 1–16.https://doi.org/10.19030/jier.v13i1.9907

Delgado, P., Vargas, C., Ackerman, R., & Salmerón, L. (2018). Don't throw away your printed books: A meta-analysis on the effects of reading media on reading comprehension. Educational Research Review, 25, 23–38.https://doi.org/10.1016/j.edurev.2018.09.003

Eddy, E., Usman, A., & Dafitri, H. (2021). Training on the use of the Quizizz application as an alternative evaluation medium for distance learning. Tunas Journal, 2(2).

Eka, A., & Nugraha, P. (2021). Training on the use of Quizizz as an online learning evaluation medium. Journal of Community Service, 12(2), 291–296.

Goodfellow, R. (2011). Literacy, literacies and the digital in higher education. Teaching in Higher Education, 16(1), 131–144.

Guilford, J. P. (1973). Characteristics of creativity.

Helsper, E. J., Scheider, L. S., van Deursen, A. J., & van Laar, E. (2020). The youth digital skills indicator: Report on the conceptualization and development of the YSKILLS digital skills measure.

Kesici, A. (2022). The effect of digital literacy on creative thinking disposition: The mediating role of lifelong learning disposition. Journal of Learning and Teaching in the Digital Age, 7(2), 260–273.https://doi.org/10.53850/joltida.1063509

Kurnia, A., Sukarmin, & Sunarno, W. (2021). Patterns of creative thinking abilities viewed from the perspective of middle school students' gender in science learning. Risenologi, 6(1b), 6–10.https://doi.org/10.47028/j.risenologi.2021.61b.235

Liu, Z.-J., Tretyakova, N., Fedorov, V., & Kharakhordina, M. (2020). Digital literacy and digital didactics as the basis for new learning models development. International Journal of Emerging Technologies in Learning, 15(14), 4–18.https://doi.org/10.3991/ijet.v15i14.14669

Martzoukou, K., Panayiotakis, I., Herbert, N., Grey, E., & MacDonald, N. (2023). 'Maddie is online': A creative learning path to digital literacy for young people. Computers in the Schools, 1–30.https://doi.org/10.1080/07380569.2023.2276736

Matud, M. P., Rodríguez, C., & Grande, J. (2007). Gender differences in creative thinking. Personality and Individual Differences, 43(5), 1137–1147.https://doi.org/10.1016/j.paid.2007.03.006

Mulyono, M., Ardiansyah, AS, Fariz, R., & Khoirunnisa, K. (2020). Gender perspective on students' creative thinking skills in blended learning assisted by Google Classroom. Kreano: Journal of Creative-Innovative Mathematics, 11(2), 245–255.https://doi.org/10.15294/kreano.v11i2.26540

Mursidik, EM, Samsiyah, N., & Rudyanto, HE (2015). Creative thinking ability in solving open-ended mathematical problems viewed from the level of mathematics ability of elementary school students. Pedagogia: Journal of Education, 4(1), 23–33.

Nasrullah, R., Aditya, W., Satya, TI, Nento, MN, Hanifah, N., Miftahussururi, M., & Akbari, Q. (2017). Digital literacy support materials. Ministry of Education and Culture.

Reichert, F., Lange, D., & Chow, L. (2021). Educational beliefs matter for classroom instruction: A comparative analysis of teachers' beliefs about the aims of civic education. Teaching and Teacher Education, 98, 103248.https://doi.org/10.1016/j.tate.2020.103248

Rizal, R., Rusdiana, D., Setiawan, W., Siahaan, P., & Susanti, E. (2021). Correlation of digital literacy and creative thinking skills of prospective physics teachers in school physics lecture using LMS3. AIP Conference Proceedings.

Siswono, TYE (2004). Mathematics learning approach. Department of National Education of the Republic of Indonesia.

Siriwatchana, K., Na-Songkhla, J., & Nilsook, P. (2018). How to enhance digital literacy skills among information science students. International Journal of Information and Educational Technology, 8(4), 292–297.https://doi.org/10.18178/ijiet.2018.8.4.1050

Suprapto, S., Zubaidah, S., & Corebima, AD (2018). The influence of gender on students' creative thinking skills in biology learning. Journal of Education: Theory, Research, and Development, 3(3), 325–329.

Tabieh, AA, Al-Hileh, MM, Abu Afifa, HM, & Abuzagha, HY (2021). The effect of using digital storytelling on developing active listening and creative thinking skills. European Journal of Educational Research, 10(1), 13–21.

Wibawa, RP, Astuti, RI, & Pangestu, BA (2019). Smartphone-based application “Quizizz” as a learning media. Educational Dynamics, 14(2), 244–253.https://doi.org/10.15294/dp.v14i2.23359

Yan Mei, S., Yan Ju, S., & Adam, Z. (2019). Implementing Quizizz as game-based learning in the Arabic classroom. European Journal of Social Science Education and Research, 5(1), 194–198.https://doi.org/10.2478/ejser-2018-0022