

MOBILE TECHNOLOGY AND PROBLEM-SOLVING ABILITY IN ELEMENTARY SCHOOL STUDENTS**Lamijan Hadi Susarno, *Fajar Arianto and Bachtiar S Bachri**

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Abstract

This study aims to determine the relationship between the used of mobile technology with problem solving abilities in elementary school students. The research method used is explanatory, to determine the relationship between two variables. The research subjects were elementary school students are about 113 students. The analytical technique used is correlational to find the relationship between the two variables, namely the use of mobile technology and problem solving abilities. The results of data analysis with product moment correlation showed $r = -.200$, and $p = .033$. The results showed that there was a relationship between the use of mobile technology and the problem solving ability of elementary school students.

Keywords: Mobile technology, problem solving, smartphone, elementary school, mobile device

INTRODUCTION

Mobile technology has been used by students in every activity, ranging from learning, entertainment, to socializing with higher ownership (Clarke and Svanaes, 2015). Tangney and Bray (2013) argues that the use of mobile technology in its use is still less effective in its use even though many studies have shown innovative ways to use it. While children spend their time using digital devices has increased and research related to the use of mobile technology on child development shows negative and positive effects (Hosokawa and Katsura, 2018). The use of mobile technology in many studies shows that when used in learning it can facilitate learning and allow students to access information and interact with teachers or friends, as well as collaborate in building knowledge (Khlaif, 2018). Utilization of mobile technology in learning, Tiwari (2022) conveys three basics in its use, namely productivity, coordination, and transformation. Martin and Ertzberger (2013) describe the functions of mobile devices that help in learning, namely (1) geospatial technology; (2) mobile search (visual search), (3) use of camera for taking pictures (4) social networking. Mobile technology is used by students related to the material being studied, and collects, organizes and exchanges data (Avraamidou, 2008). Mobile devices allow students to easily communicate with friends, teachers or other experts to exchange information. Vygotsky (1978) in Reyhav et al. (2015,) shows that social interaction is very important in successful learning. Students are increasingly involved in learning through mobile technology, the more it becomes the right method to encourage problem solving in the classroom (Lötter and Jacobs, 2020). Teachers really need to grow and foster students' cognitive development through involving them intentionally and systematically in meaningful and challenging problem solving processes (Kim and Hannafin, 2011 in Lötter and Jacobs, 2020). Problem solving competence is involving students in problem solving using a variety of different strategies, the process includes exploring and understanding, formulating, planning and implementing, as well as monitoring (Song, 2018).

The use of various available applications supports students in providing material in the context of creating and imparting knowledge in an environment that focused on media, and increases student motivation and supports meaningful learning experiences (Lötter and Jacobs, 2020). Mobile technology can provide experimental experiences for students by utilizing various devices available on mobile devices to make learning fun (Lai *et al.*, 2007). Nikolopoulou (2021) states that digital resources have the potential to support student learning under certain conditions, for example in thematic learning where students are invited to discuss their ideas and support collaboration. This study investigates the relationship between the used of mobile technology on students' problem solving abilities.

METHODS

This research is an explanatory research that aims to explain the relationship between variables (Fraenkel and Wallen, 2009). The method used is correlational to determine whether the two variables have a relationship between variables, namely the use of mobile technology and problem solving abilities. The research instrument used was a questionnaire with a likert scale of 1 - 4 (1 = disagree; 2 = disagree; 3 = agree; 4 = strongly agree). The instrument for using mobile technology consists of six indicators, (1) finding information on mobile devices; (2) the use of mobile devices for learning, (3) the use of learning in schools, (4) the use of mobile devices in the classroom, (5) ownership of mobile devices for learning, (6) doing school assignments. The problem solving ability instrument adapts from Heppner and Petersen, (1982) Heppner and Petersen, (1982) takes two indicators, namely self-confidence in problem solving and personal control. The research subjects were elementary school students in grade V with a total of 113 students. The analytical technique used in this research is Pearson's product-moment correlation or Pearson's r (Jackson, 2009).

RESULT AND DISCUSSION

In table 1, research data on the use of mobile technology with problem solving abilities shows linearity ($p = 0.033 < 0.05$).

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Table 1. Mobile Technology linearity with Problem Solving between groups

	(Combined)	Linearity	Deviation from Linearity	Within Groups	Total
Sum of Squares	326.026	56.134	269.892	1073.903	1399.929
df	22	1	21	90	112
Mean Square	14.819	56.134	12.852	11.932	
F	1.242	4.704	1.077		
Sig.	.235	.033	.387		

Table 2. Correlation of Mobile Technology's Product Moment to Problem Solving Ability

Correlations		Problem Solving	Mobile Technology
Problem Solving	Pearson Correlation	1	-.200*
	Sig. (2-tailed)		.033
	N	113	113
Mobile Technology	Pearson Correlation	-.200*	1
	Sig. (2-tailed)	.033	
	N	113	113

*. Correlation is significant at the 0.05 level (2-tailed).

These results can be concluded that the data for the variable use of mobile technology and problem solving ability shows linearity. Based on the results of the analysis (Table 1), it is known that the value of Sig. (2-tailed) between the use of mobile technology and problem solving ability is $0.033 < 0.050$, which means that there is a correlation between the use of mobile technology and problem solving abilities. Based on the calculated r value of -0.200 , where r arithmetic $-0.200 > r$ table 0.184 , it can be concluded that there is a relationship or correlation between mobile technology and problem solving abilities. The correlation coefficient in this study was -0.200 , it can be concluded that the correlation between the use of mobile technology on students' problem solving abilities is relatively low, because the tendency is close to 0. The results show that there is a relationship between the use of mobile technology by students and the problem solving abilities of elementary school students. Dekhane, Xu, and Tsoi (2003) research results show the influence of the use of mobile technology with problem solving. Students' use of mobile technology leads to meaningful collaborative interactions in problem solving by exploring their mobile devices (Sjöberg and Brooks, 2022). Kim, et al. (2011) in his research shows that the use of mobile technology is not affected by the education level of parents, the experience of teachers or principals, or the perception of teachers or technology preparation, but rather the active adoption is carried out by students.

Students can use their tools to develop literacy and language Learning (Kim, et al., 2011). The use of mobile technology, mobile devices, makes it easier for students to solve realistic mathematical problems (Bray and Tangney, 2016). Furthermore (Bray and Tangney, 2016) explains that students are greatly helped in understanding mathematical concepts by using their mobile devices which have transformative potential. Mobile technology can be seen as an electronic service that provides general and educational content to students regardless of space and time. And provide authentic learning and feedback quickly, and support learning activities in the classroom and outside the classroom (Lai, Yang, Chen, Ho, and Chan, 2007). The role of parents in the use of mobile technology greatly affects the function as a learning resource. Archer, Wood, and Pasquale (2021) explain that children's abilities can be achieved when a suitable-scaffolding is provided for the learning task. There are three types of mobile technology scaffolding, namely cognitive, affective, and technical.

Cognitive scaffolding facilitates children's understanding of concepts through parental modeling or questioning. The affective scaffolding encourages ongoing engagement through praise and encouragement. Technical scaffolding refers to effective instructional strategies built into software design such as live feedback and automated leveling. Parents and children can engage in developmentally appropriate scaffolding to support their children's learning and engagement in the context of technology play. Parents and children reading together through their mobile technology can improve children's literacy skills (Eutsler, Hardaker, and Watulak, 2017). Hwang, Lai, Liang, Chu, and Tsai (2018) in their research show that the use of mobile technology in learning has a positive impact on students interacting with peers, and involvement in higher-order thinking such as problem solving, critical thinking, and creativity. The use of Android-Assisted Mobile Physics Learning in research shows an increase in student problem solving (Shabrina and Kuswanto, 2018). Students with the use of mobile technology in their learning process have a new way of learning where on the device there are various learning resources that adapt to the characteristics of the user or students choose the appropriate source for themselves (Lindsay, 2016). Utilizing mobile technology, students can learn anywhere and anytime, and are free to choose the information that is accessed that allows them to study independently and find interesting learning topics (Cheng and Siow, 2018).

Conclusion

The use of mobile technology has a relationship with problem solving abilities in elementary school students. Students can take advantage of their mobile technology to support their learning activities. The role of parents affects the use of mobile technology in the student learning process. The use of mobile technology in elementary school students can improve higher order thinking skills, problem solving, literacy skills, and collaboration. Elementary school students in the used of mobile technology helps them to use it for their learning purposes.

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