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The role of creative learning resource design in enhancing literacy and numeracy skills: A study of the Kampus Mengajar program

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Abstract

This study aims to explore the relationship between creativity in learning resource design and the improvement of literacy and numeracy skills among students in the Kampus Mengajar Program, Batch 7. Specifically, the study seeks to: 1) identify the correlation between creativity in learning resource design and literacy, and 2) examine the relationship between creativity in learning resource design and numeracy. Employing a quantitative research design, the study uses a product-moment correlation method with a non-probability sampling approach, consisting of 30 students. Data were collected through a Google Forms questionnaire, and prerequisite tests, including normality and linearity tests, were conducted. Hypothesis testing was performed using a correlation test. The results reveal a statistically significant positive relationship between creativity in learning resource design and literacy (Sig. = 0.027 < 0.05), as well as between creativity in learning resource design and numeracy (Sig. = 0.019 < 0.05). These findings suggest that creative learning resource design developed by students in the Kampus Mengajar program plays a key role in enhancing both literacy and numeracy skills in schools. The study contributes to the understanding of effective teaching strategies within the Kampus Mengajar Program and highlights the importance of creative approaches in addressing educational challenges.

INTRODUCTION

Education is a means that aims to produce students who have positive characters. According to Law No. 2003, education is an effort made consciously and planned to create an active learning atmosphere and learning process in developing students' potential, such as spiritual strength, self-control, personality, intelligence, noble morals, and skills (Rizqon *et al.*, 2016). In education, it is necessary to involve students or students from various backgrounds. These different backgrounds include educators or teachers, students, and lecturers. The aim of education is to create synergy between educational stakeholders. With various experiences that have been experienced in the learning process, students can enrich their insights and knowledge to teachers, students, and lecturers (Hanifah *et al.*, 2023). And with the many insights possessed by educators. They must create an interesting, effective and efficient learning atmosphere that is not dull. One effort that can be made is to create or use learning resources in the learning process.

In Law of the Republic of Indonesia No. 20 of 2003 concerning the National Education System Chapter 1 Article 1, paragraph 20 states that the learning process has the meaning of an interaction process carried out by students, educators, and learning resources in a learning environment (The government of Indonesia, 2003). To support the learning process equipped with

learning resources, all educators must be able to design learning resources according to the conditions of students, classes, and lessons as creatively as possible. That way, the learning process will run according to the objectives. In the current problems, namely low student literacy and numeracy, learning process actions using the necessary learning resources.

However, according to a survey conducted by the Program for International Student Assessment (PISA) released in 2022, Indonesia rose 5 to 6 positions from its 2018 PISA ranking. This means Indonesia is ranked 61st or 62nd out of 70 countries (Umbara & Suryadi, 2019). Therefore, literacy and numeracy have become one of the government's priority programs since 2019, and they have been promoted in all schools in Indonesia (Rachman *et al.*, 2021). The literacy and numeracy priority program is carried out by requiring students to read or borrow books from the library, and after that, students are asked to review the books they have read. However, this stopped due to the spread of the Covid-19 virus. The government has initiated various efforts to improve literacy and numeracy skills, such as the School Literacy Movement (GLS) (Rachman *et al.*, 2021). Referring to GLS, the centre is called the school library in this activity. The library utilisation program greatly supports increased literacy (Krismanto, 2017).

The spread of schools in various regions with different conditions, access, and facilities makes the government think hard about reversing or improving the quality of literacy and numeracy that is delayed and/or lagging. Thus, the Kampus Mengajar program Batch 1 was born in 2020/2021 (Rachman *et al.*, 2021). Indonesia's emergency initiated the Kampus Mengajar program, so it needed the help of students, teachers, and students in elementary schools to get optimal learning opportunities even though they were still in limited and critical conditions during the pandemic. The Kampus Mengajar program's main objective is to help elementary and secondary students improve their literacy and numeracy skills after being hampered by the virus and to equalise Covid-19 education (Lestari *et al.*, 2023).

According to the objectives of the Kampus Mengajar program, students are expected to impact education positively. Furthermore, to address the previously described challenges, students are encouraged to help improve literacy and numeracy skills by creating innovative learning resources. However, most existing studies (Andika, Yunita, & Lisdayanti, 2024; Febrianti, Elyusra, & Atmaja, 2024; Ismail., Slamat, & Wabula, 2024; Monica, Yuniati, & Suyuthi, 2024; Satria, Riswanto, & Ayuh, 2024; Wulandari, Suyuthi, & Lisdayanti, 2024; Zaki *et al.*, 2024) have primarily focused on the Kampus Mengajar program and its impact on the students numeracy and literacy skills but without considering creativity as one of the most crucial element in designing any support for the students.

Therefore, this study aims to investigate the learning resources designed by participating students, highlighting the role of creativity in their development and its impact on students' literacy and numeracy skills. Therefore, this study will contribute significantly to the ongoing discourse on literacy and numeracy skills within the broader context of educational policymaking and implementation in Indonesia.

LITERATURE REVIEW

A. Creativity in designing learning resources

According to Mihaly Csikszentmihalyi, creativity is the presence of a creative spirit in thinking and acting to create a new realm (Dzulhidayat, 2022). Creativity can be defined as the discovery of something new by utilising existing elements in a way that is beneficial and capable of solving problems. Likewise, Saputra (2020) states that creativity consists of several indicators. First, agility refers to a person's ability to generate ideas that may not be commonly known. Second, flexibility is the ability to produce and adapt diverse ideas into new approaches. Third, originality is the capacity to generate unique and ingenious ideas others do not possess. Lastly, elaboration is the ability to further develop new concepts based on one's thoughts.

In this regard, creativity is important in learning resource design and development. Bringing these perspectives together, creativity in designing learning resources emerges as a crucial factor in making educational materials more engaging and effective. A well-designed learning resource can capture students' interest, enhance comprehension, and help them achieve learning goals more efficiently. According to Permatasari and Patta (2024), integrating active, innovative, and creative media in the learning process can foster curiosity, increase motivation, and improve students' focus.

According to AECT (Samsinar, 2019), learning resources encompass all sources in the form of data, humans, and materials that students can use independently or in combination to facilitate the learning process. These resources include messages, people, materials, tools, techniques, and the environment. The book Development of Media and Learning Resources Theory and Procedures states that learning resources should be beneficial and make it easier for students to achieve their learning goals (see Ani, 2019). Learning resources have become increasingly diverse, flexible, and innovative as technology rapidly evolves.

To better understand the classification of learning resources, AECT (Manurung, 2018) distinguishes six types based on their usage: (1) Messages, which include formal or informal learning materials; (2) People, who act as sources of knowledge and information; (3) Materials and programs, which consist of software-based learning programs; (4) Tools, referring to hardware that serves as a medium or aid in learning; (5) Methods, which are procedures used to deliver instructional content; and (6) Background, which relates to the learning environment in any setting. Meanwhile, education expert Sudjana (Samsinar, 2019) categorises learning resources into five groups: (1) Printed learning resources; (2) non-printed learning resources; (3) Learning resources in the form of facilities; (4) Learning resources in the form of activities; and (5) Learning resources in the form of the environment.

B. Literacy and numeracy ability

The word ability originates from capable, which means "being able," and refers to an individual's competence in performing tasks or activities effectively. According to Robbins *et al.* (2012), ability is defined as a person's capacity to carry out a task or job successfully, depending on their skills, knowledge, and experience. Abilities can be developed through education, training, and practice, allowing individuals to enhance their performance in various domains. Generally, ability is categorised into two main types: intellectual ability and physical ability. Intellectual ability involves cognitive and mental processes such as problem-solving, reasoning, memory, creativity, and decision-making, which are crucial for academic achievement, professional success, and everyday problem-solving. In contrast, physical ability pertains to an individual's bodily strength, endurance, coordination, and agility, essential for tasks requiring physical effort, such as sports, manual labour, and motor skills.

Furthermore, this study examines student literacy and numeracy as essential components of intellectual ability, which play a fundamental role in cognitive development and academic achievement. According to the Ministry of Education and Culture (2016, as cited in Hasanah & Silitonga, 2020), literacy is the ability of students to access, understand, and utilise information appropriately and intelligently through activities such as reading, observing, writing, and speaking. Literacy is the ability to read and write and involves critical thinking, comprehension, and the practical application of knowledge in various contexts. It enables individuals to analyse, interpret, and communicate information clearly, essential for academic success, lifelong learning, and personal growth.

Literacy offers numerous benefits that enhance academic success and intellectual development. It expands vocabulary, strengthens communication skills, and improves cognitive functions like critical thinking and problem-solving. Strong literacy skills enable students to comprehend and retain information effectively, broadening their knowledge and enhancing learning

outcomes. Additionally, literacy refines language accuracy, fosters analytical thinking, and aids in evaluating information critically. It also improves focus and concentration, allowing deeper engagement in studies. By developing these essential skills, literacy empowers students to become independent learners, confident communicators, and critical thinkers, preparing them for academic, professional, and social success (Harahap *et al.*, 2022).

According to the National Center for Education Statistics (NCES) (2007, as cited in Harahap *et al.*, 2022), literacy skills consist of six essential components: (1) Text search skills, which refer to the ability to locate specific information within a text efficiently; (2) Basic reading skills, including decoding and fluently recognising words, which are fundamental for accurate pronunciation and comprehension; (3) Language skills, which encompass the ability to communicate effectively through speech; (4) Inferential skills, or the ability to draw appropriate conclusions based on textual information; (5) Application skills, which involve carefully applying new knowledge and drawing conclusions to solve problems effectively; and (6) Computation identification skills, which refer to the ability to identify and solve quantitative problems through calculation.

Likewise, the Ministry of Education and Culture (2020) defines numeracy skills as using mathematical concepts, procedures, facts, and tools to solve problems in various appropriate contexts. The assessed competencies include logical thinking, systematic thinking, and reasoning skills using concepts (Tenny *et al.*, 2021). Mathematics and numeracy share the same foundation but differ in applying knowledge and skills. If students only learn mathematical knowledge, they lack numeracy skills. Numeracy activities aim to develop or improve the ability to understand, use, and manipulate numbers. Numeracy includes skills in applying mathematical concepts and rules to everyday life in both mathematical and non-mathematical contexts (Dantes & Handayani, 2021).

Meanwhile, the Programme for International Student Assessment (PISA) defines numeracy as emphasising students' abilities to convey ideas effectively, provide reasoning, analyse, solve, formulate, and interpret various mathematical problems in all situations (Shabrina, 2022). These thinking skills involve using concepts, procedures, or other mathematical tools to solve problems in everyday life, both in individual and social contexts. Examples from Mardiana *et al.* (2021) include (1) Algebra, which involves calculating numbers, measuring data and uncertainty, and geometry; (2) Reasoning, application, and understanding, where students are required to reason, understand, and apply algebraic concepts or knowledge explained by educators; and (3) Socio-cultural, individual, and scientific contexts, where students must have the ability to solve numeracy problems in the socio-cultural domain and apply algebra to real-world societal conditions.

C. Kampus Mengajar program

The Kampus Mengajar program is integral to the Merdeka Belajar Kampus Merdeka (MBKM) initiative, designed to enhance students' involvement in teaching assistance activities. The program empowers university students to support and improve the learning process in elementary schools across various villages in Indonesia, particularly in under-resourced areas or in need of educational support (Fani & Tranggono, 2023). The initiative was launched in response to the global Covid-19 pandemic, which disrupted educational systems worldwide for an extended period. In Indonesia, as in many other countries, the pandemic forced a shift to remote learning, relying heavily on technology and internet access. However, this rapid transition revealed significant challenges, including instability in facilities, lack of proper infrastructure, limited internet connectivity, and gaps in technological literacy, all of which impacted learning effectiveness (Anwar, 2021).

The primary goal of the Kampus Mengajar program is to support elementary and middle schools in Indonesia, especially those with an accreditation rating of at least C and located in 3T areas (frontier, outermost, and disadvantaged). These areas often face the most significant edu-

cational challenges, making them a program's primary focus (Anwar, 2021). The program aims to empower students by training them to assist in various aspects of the educational process. This includes helping to adapt and integrate technology into the classroom, improving students' literacy and numeracy skills, and assisting with school administration tasks. The focus is on academic support and holistic development, fostering an environment where students can grow academically and personally.

Kampus Mengajar is structured to focus on literacy and numeracy as its core components, which are essential for students' foundational development. The program spans four months each semester, during which university students work directly in schools, assisting teachers and helping students overcome learning challenges. Through their involvement, students participating in the program are expected to develop creativity, strengthen their interpersonal skills, and build leadership qualities. In addition to providing direct academic support, the program encourages students to contribute to improving the learning environment, both in the classroom and within the broader school community. This dual-purpose approach benefits the schools and provides university students invaluable experience contributing to their personal and professional development.

METHOD

This study is a type of quantitative research. Quantitative methods are considered traditional because they are based on positivist philosophy, are scientific, and are used to discover various aspects of science and technology. These methods process data in numbers, which are analysed using statistics (Sugiyono, 2019). The research design in this study is descriptive, which is used to create a systematic and detailed picture of the existing phenomena (Sugiyono, 2019). The population in this study consists of students majoring in X who participated in the Kampus Mengajar program, with 39 students. The sampling technique used was saturated sampling. Saturated sampling is a technique for selecting all population members as samples (Sugiyono, 2020). This study hypothesises that there is a relationship between student creativity in designing learning resources and students' literacy skills in the Kampus Mengajar program and between student creativity in designing learning resources and numeracy skills in the Kampus Mengajar program.

Table 1 Instrument grid

No	Variable	Indicator
1	Creativity in learning resource design	dexterity Flexibility Originality Elaboration
2	Literacy	Text search skill Basic reading Language skill Inferential skill drawing appropriate text-based inference Application skill applying Computation identification skill
3	Numeracy	Algebra Reasoning implementation Understanding Socio-cultural Individual scientific

The data collection technique used in this study was a questionnaire. This questionnaire technique is the most efficient because researchers can know the measured variables and the

respondents' answers, making it easier for researchers. After all, respondents cannot be reached (Sugiyono, 2019). The questionnaire uses a Likert scale with five answer options to make it more varied. The instrument in this study was taken from indicators, which were then developed into 86 statement items.

The data validity technique used in this study is the validity test, which aims to measure whether the instrument is valid. This is done with the help of the SPSS program, which uses the calculated r obtained from the bivariate correlation analysis. The goal is to correlate the total score (calculated r) with the table r. In this study, the table r value for the validity test calculation is 0.361, with a significance level of 5%. The instrument is considered valid if the calculated r is greater than the table r value, or if the significance value is less than 0.05.

Table 2 Variable validity

No	Variable	Total Items	Valid	Invalid
1	Creativity in learning resource design	25	20	5
2	Literacy	32	20	12
3	Numeracy	28	20	8

Data analysis techniques involve grouping data based on variables and respondent types, tabulating data according to these variables from all respondents, presenting data for each variable, performing calculations to answer research questions, and conducting calculations to test hypotheses (Sugiyono, 2019). The data analysis process includes several procedures. First, descriptive analysis analyses collected data by describing or illustrating it without concluding. Second, the normality test determines whether the variables are normally or abnormally distributed (Sugiyono, 2019). In this study, the normality test is performed using the SPSS program with the Shapiro-Wilk formula, as the number of respondents is less than 50. Third, the linearity test determines whether the relationship between variables (X and Y) is linear or non-linear (Sugiyono, 2019). Lastly, hypothesis testing uses the Pearson product-moment correlation test to determine whether the research hypothesis is accepted or rejected. All tests are conducted with the help of the SPSS program.

RESULT AND DISCUSSION

This section will elucidate the study's results and expand on the discussion related to the findings. The first subsection presents illustrations of the descriptive analysis of the data, the normality test, the linearity test, and the correlation test, followed by a discussion of the results of the statistical tests.

A. The result of the study

The data used in this study come from a questionnaire on creativity in learning resource design, literacy, and numeracy variables. The data description aims to determine the data count, minimum value, maximum value, average value, and standard deviation. The results of the data description analysis are presented in Table 3.

The creativity variable in learning resource design has an average value of 62.80, with a minimum value of 53, a maximum value of 73, and a standard deviation of 5.041. The literacy variable has an average value of 78.57, a minimum value of 67, a maximum value of 88, and a standard deviation of 4.890. The numeracy variable has an average value of 82.20, a minimum value of 72, a maximum value of 92, and a standard deviation of 5.945. These results indicate that the average values of the three variables are relatively high, as evidenced by their proximity to the maximum values. The data variance is also relatively large, considering the distance between the average values and the standard deviations.

Table 3 Descriptive analysis

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Creativity in learning resource design	30	53	73	62,80	5,041
literacy	30	67	88	78,57	4,890
numeracy	30	72	95	82,20	5,945
Valid N (listwise)	30				

Furthermore, the normality test determines whether the data are typically distributed. In this study, the Shapiro-Wilk test is used. The criteria for this test are as follows: (a) If the significance value is more significant than 0.05, then the variables X with Y_1 and Y_2 are typically distributed. (b) If the significance value is less than 0.05, then the variables X with Y_1 and Y_2 are not normally distributed.

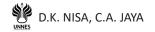**Table 4** Normality test of creativity in design of learning resources, literacy, numeracy

Descriptive Statistics						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Creativity in learning resource design	.169	30	.029	.969	30	.508
Literacy	.121	30	.200*	.984	30	.914
Numeracy	.138	30	.149	.965	30	.409

The Shapiro-Wilk test results indicate that the data are normally distributed. Since the number of respondents is only 30, each variable's significance (Sig.) values were analysed. The creativity variable for learning resource design has a Sig. value of 0.508, greater than 0.05 (0.508 > 0.05). The literacy variable has a Sig. value of 0.914, also more significant than 0.05 (0.914 > 0.05). Similarly, the numeracy variable has a Sig. value of 0.409, which is above 0.05 (0.409 > 0.05). Based on these results, it can be concluded that the data for all three variables are normally distributed.

Table 5 Linearity test of creativity in learning resource design related to literacy

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
literacy* creativity in learning resource design	Between Groups	(Combined)	261.400	13	20.108	.745	.701
		Linearity	2.349	1	2.349	.087	.772
		Deviation from Linearity	259.051	12	21.588	.800	.647
	Within Groups		431.967	16	26.998		
	Total		693.367	29			

The linearity test determines whether the relationship between variables is linear or non-linear. In this study, the Test for Linearity was applied. The decision criteria for this test are as follows: (a) If the significance value for deviation from linearity is more significant than 0.05, then variable X has a linear relationship with variables Y_1 and Y_2. (b) If the significance value for devia-

tion from linearity is less than 0.05, then variable X has a non-linear relationship with Y₁ and Y₂.

The deviation from the linearity value is 0.647, greater than 0.05 (0.647 > 0.05). Therefore, it can be concluded that the variables have a linear relationship.

Hypothesis testing is conducted to determine whether the proposed hypothesis is accepted or rejected. In this study, the Pearson product-moment correlation test is used with the assistance of the SPSS software program. The decision criteria for this test are as follows:

1. If the significance value is less than 0.05 (<0.05), then Ha is accepted, and Ho is rejected.

2. If the significance value is greater than 0.05 (>0.05), then Ho is accepted, and Ha is rejected.

Table 6 Linearity test of creativity in learning resource design related to literacy

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
literacy * creativity in learning resource design	Between Groups	(Combined)	320.017	13	24.617	.559	.852
		Linearity	17.269	1	17.269	.392	.540
		Deviation from Linearity	302.748	12	25.229	.573	.834
	Within Groups		704.783	16	44.049		
	Total		1024.800	29			

Table 7 Correlation test

Correlations		creativity in learning resource design	literacy	Numeracy
creativity in learning resource design	Pearson Correlation	1	.404*	.426*
	Sig. (2-tailed)		.027	.019
	N	30	30	30
Literacy	Pearson Correlation	.404*	1	.836**
	Sig. (2-tailed)	.027		.000
	N	30	30	30
numeracy	Pearson Correlation	.426*	.836**	1
	Sig. (2-tailed)	.019	.000	
	N	30	30	30

Based on Table 7, the Pearson product-moment correlation test results indicate a relationship between the variables. First, the correlation between the creativity in the learning resource design variable and the literacy variable has a significance (Sig.) value of 0.027, which is less than 0.05 (0.027 < 0.05). This suggests that the two variables are related. The correlation analysis shows that the calculated r value is 0.404, while the table r value is 0.361. Since 0.404 > 0.361, it can be concluded that the two variables have a positive correlation. Therefore, Ha is accepted, and Ho is rejected. Similarly, the correlation between the creativity in learning resource design variables and the numeracy variable has a Sig. value of 0.019, which is also less than 0.05 (0.019 < 0.05),

indicating a significant relationship. The calculated r value is 0.426, while the table r value is 0.361. Since 0.426 > 0.361, this confirms a positive correlation between the two variables. As a result, Ha is accepted, and Ho is rejected.

B. Discussion

As this study addresses two focuses, literacy and numeracy, the discussion below will address the relationship between student creativity in designing learning resources with both of topics.

1. The relationship between student creativity in designing learning resources and literacy

In this research, students in the Kampus Mengajar program designed learning resources by optimizing their creativity to enhance literacy. Learning resources used in literacy-focused activities, such as e-modules, were designed to be engaging and effective. These e-modules were created using Google Slides to produce interesting and enjoyable learning materials. By creatively designing learning resources like e-modules, students can develop essential skills, including text search skills, basic reading decoding and word recognition, and language skills. This finding aligns with research conducted by Hidajat and Susilowati (2018), which suggests that using e-modules can enhance literacy efficiency by capturing the attention of students who find traditional learning monotonous and unengaging. Additionally, e-modules can help train students to read fluently.

Furthermore, flexibility in designing learning resources allows for the creation of engaging and interactive materials. Learning resources can be designed in various formats, including interactive websites where students can develop Quizziz for practice and evaluation. These websites enable students to complete exercises efficiently and enjoyably. With this approach to learning resource design, students can develop application skills by actively applying their knowledge. This finding aligns with research conducted by Hamid *et al.* (2023), which suggests that using Quizziz helps train students to answer questions in real time while receiving immediate feedback, making learning more interactive and enjoyable. However, the study also emphasised that literacy improvement is not limited to Quizziz but can be supported by activities such as crossword puzzles.

In designing learning resources, students also use originality. In this case, students can design learning resources such as literacy trees by making tree-shaped decorations equipped with writings designed to be as attractive as possible. In addition, students can also name trees or plants in the school environment. Students can use the environment to be presented as a learning resource in practising literacy. With these learning resources, students can develop basic skills such as text search skills and basic reading, such as decoding and recognising words fluently. This finding aligns with research conducted by (Rosmiati *et al.*, 2023) that students become enthusiastic and motivated in reading by using literacy tree learning resources. Because the literacy tree is designed to be as attractive as possible, it can make it easy for students to understand texts and readings, summarise readings, and find texts in a reading in a short time.

Finally, in designing learning resources, students also incorporate elaboration by introducing new elements such as wall magazines and reading corners. These resources help students develop essential skills, including text search, basic reading (decoding and word recognition), language, and application skills. This finding aligns with research by Harahap *et al.* (2018), which states that wall magazines can enhance knowledge, literacy, and interest by providing journals, books, and other reading materials in an engaging format. Additionally, this study supports the findings of Harianja *et al.* (2023) regarding the effectiveness of reading corners. Designed to be as inviting and comfortable as possible, the reading corner helps train literacy skills such as word and sentence comprehension, summarisation, and efficient text searching. This is because students develop reading habits through regular practice.

2. The relationship between student creativity in designing learning resources and numeracy

In designing learning resources, students demonstrate dexterity by channelling their ideas into materials that support the numeracy process, striving to make them as engaging as possible. One practical approach is incorporating interesting videos into numeracy activities while also utilising the internet to find relevant materials and formulas that are easy to understand. Developing these resources creatively helps students acquire fundamental numeracy skills, including algebra, numbers, measurement and geometry, data analysis, and probability. This finding aligns with research conducted by Rachman *et al.* (2021), which highlights the effectiveness of well-designed learning videos in enhancing numeracy skills. Their study found that such videos help students retain and comprehend material more effectively, making learning both interactive and efficient.

Students can also demonstrate flexibility when designing learning resources. Those improving their numeracy skills can develop or utilise various engaging websites and platforms in this context. They can use the internet to find additional materials, search for relevant videos on YouTube, and explore other online resources. For quizzes and assessments, students can leverage Quizizz, Google Forms, Wordwall, Mathletics, and more tools. With flexibility in designing learning resources, students can acquire essential numeracy skills, including algebra, numbers, measurement and geometry, data analysis, and probability. This finding aligns with research conducted by Ayuningtyas and Rigianti (2023), which emphasises that learning should evolve alongside technological advancements, incorporating web-based platforms. Beyond introducing students to technology, these digital learning resources serve as effective alternative learning media. They facilitate efficient comprehension of numeracy concepts and help students apply their knowledge to solve real-world numerical problems.

In designing learning resources, students also incorporate originality by creating engaging and interactive materials. For example, they can design educational games that integrate numbers and formulas, allowing students to learn while playing. One such game is numeration hopscotch, where the traditional hopscotch grid is modified to include numeracy elements. Through these learning resources, students develop essential skills such as algebra, number operations, measurement and geometry, data analysis, probability, reasoning, application, and problem-solving abilities in numeracy. This finding aligns with research conducted by Harianja *et al.* (2023), which highlights that students can engage with numeration hopscotch during breaks or free time, allowing them to continue learning in a fun and interactive way. This learning resource is highly effective, as combining play with learning makes concepts easier to understand and remember, ultimately improving numeracy and problem-solving skills.

Finally, in designing learning resources, students incorporate elaboration by transforming their school environment into an interactive learning tool. One example is the smart ladder, where length units are marked on the steps. This method is highly effective, allowing students to learn through play, making understanding and retaining concepts easier. Students develop essential numeracy skills by engaging with the smart ladder, including algebra, number operations, measurement and geometry, data analysis, and probability. Additionally, it enhances their ability to reason, apply, and comprehend numeracy concepts more effectively. This finding aligns with research by Hamid *et al.* (2023), which highlights the smart ladder as an effective numeracy training tool. Designed with length units attached to its steps, this resource helps students solve numeracy problems efficiently and with greater ease.

CONCLUSION

This research concludes that student creativity is key in designing effective learning resources for literacy and numeracy skills. For literacy, students use e-modules, platforms like Quizizz, literacy trees, and wall magazines to enhance reading, decoding, and language skills. In numeracy, they use videos, digital platforms, numeracy hopscotch, and smart ladders to develop calculation

skills, reasoning, and problem-solving abilities. By incorporating dexterity, flexibility, originality, and elaboration, these resources make learning more engaging and effective, helping students apply their skills to real-world challenges in both literacy and numeracy. For future research, it would be beneficial to explore the long-term impacts of these creative learning resources on student achievement, the role of teacher training in implementing such resources, and the potential for further integrating other digital tools to enhance literacy and numeracy outcomes. Additionally, research could investigate the effectiveness of these learning methods across different age groups and educational contexts.

ACKNOWLEDGMENT

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