



Correlation Analysis of Interactive Learning Multimedia on Teaching Quality of Pre-School Teachers

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Abstract. This study aims to determine and analyze interactive multimedia learning to improve the quality of learning in early childhood education teachers. This research uses quantitative analysis through descriptive analysis and inferential analysis. The study was conducted on early childhood education teachers in Surakarta City. Researchers collected data through questionnaires, which were then analyzed using descriptive and correlation analyses. The results showed that using interactive multimedia in early childhood learning can effectively improve teachers' teaching skills. In addition, teachers' responses to interactive learning multimedia were also positive, with most teachers reporting more exciting learning experiences and more active student participation. This study implies that interactive learning multimedia should be integrated into early childhood learning approaches to improve teaching quality and students' learning experience.

Keywords: Interactive Multimedia Learning, Teaching Quality, Preschool Teacher.

1 Introduction

Early childhood education plays a vital role in forming the basis of children's learning and development from an early age. Early childhood education teachers are responsible for providing exemplary teaching, stimulating and supporting children's complete growth in various aspects, such as physical, cognitive, social, and emotional [1]. Multimedia has become a potential tool to improve the teaching quality of early childhood education teachers in the era of rapid development of information and communication technology [2]. Interactive learning multimedia is an interactive approach that combines various components, such as video, audio, images, and hands-on interaction, to make learning exciting and engaging for young children [3].

Multimedia learning is a learning approach that uses a combination of various media, such as text, images, sound, video, animation, and interactivity, to present learning materials to students [4]. Using multimedia in an educational context aims to increase the effectiveness and efficiency of the learning process and increase student

engagement and understanding. According to Mayer (2017), learning multimedia involves using words and images to convey specific information or concepts. He emphasizes that effective multimedia must be designed with appropriate cognitive principles, such as multisensory information processing principles and cognitive load regulation principles [5]. Jonassen (2011) defines learning multimedia as combining visual media, audio, text, and interactivity to help students build understanding, apply knowledge, and solve problems. He emphasizes the importance of multimedia design that facilitates active knowledge construction and authentic problem-solving [6].

Kozma (1991) states that multimedia learning includes using media and technology to present information, provide feedback, and facilitate interaction. He emphasizes the importance of media integration in a learning environment that allows students to interact with the material actively and build deep understanding [7]. Clark (2016) argues that learning multimedia does not automatically improve learning, but its effectiveness depends on proper instructional design [8]. According to him, good learning multimedia must consider proven instructional principles, such as material layout, contiguous exposure, and the focus on using appropriate media. Based on the experts' opinions above, it can be concluded that learning multimedia involves using diverse media to present information, facilitate understanding, and increase student interactivity. The successful application of multimedia learning depends on proper instructional design, practical application of cognitive and instructional principles, and student empowerment in actively accessing, creating, and interacting with media.

Interactive learning multimedia can help children learn better. Audio and video can trigger children's sense of sight and hearing, making them more engaged and excited in the learning process [9]. This model can also make learning fun, making children more motivated and eager to learn again. Interactive learning multimedia can also help early childhood education teachers provide learning that suits the wants and needs of each child [10]. Teachers can enable children to actively participate in the learning process through interactive features, such as interactive question-and-answer or game-based activities that require direct responses from children [11]. Multimedia can be accessed and used flexibly in and outside the classroom. Students can access learning materials through digital devices, such as computers, tablets, or smartphones, which allows learning to be done anywhere and anytime [12]. Examples of interactive learning multimedia applications used in early childhood education include Canva, Google Classroom, Kinemaster, Prezi, and Scratch applications; educational institutions must provide various media types and exciting content.

The reality of implementing interactive multimedia in early childhood education experiences several obstacles. Not all schools or early childhood education institutions have adequate access to multimedia devices and supporting resources, such as computers, projectors, internet access, or quality multimedia content [13]. This limitation can be an obstacle to implementing multimedia-based learning effectively. In addition, many early childhood education teachers may need more technological skills to use multimedia devices properly [14]. A lack of understanding of how to use the machines and supporting software may hinder teachers' ability to utilize the potential of multimedia learning to the fullest [15].

Preparing effective multimedia learning materials also requires more time and practice than traditional teaching methods [16]. Teachers need to search, evaluate, and select the right multimedia content and adapt it according to the needs and characteristics of students [17]. This process requires dedication, time, and extra effort from the teacher. Furthermore, early childhood education curricula often have strict time constraints and many learning components teachers must handle [18]. Integrating multimedia-based learning within a tight curriculum framework can require careful planning and flexibility in timetabling. Early childhood education teachers should consider developmentally appropriate design elements when implementing multimedia learning models. Multimedia content should be relevant and engaging for young children. In addition, teachers should ensure that multimedia media are used to support and enhance student-teacher interaction rather than replace direct interaction [19].

This study aims to describe the teaching quality of early childhood teachers in the application of interactive learning multimedia and identify the impact of using the model. Interactive learning multimedia will be used as an aid in teaching and interaction with children. This research will involve early childhood teachers and is expected to contribute to developing early childhood education through multimedia. By optimizing the use of multimedia in the learning process, the teaching quality of early childhood teachers can improve, thus positively impacting children's six aspects of development.

2 Method

This research methodology uses a quantitative research model to determine the effect of interactive learning multimedia in improving the quality of teaching early childhood education teachers in the classroom. The research design used is correlation research to determine the relationship between the variables studied and help make predictions and generalizations. This research was conducted in Surakarta City with a research sample of 50 early childhood education teachers. The data analysis used in this research is correlation analysis. Correlation analysis determines the degree of linear relationship between one variable and another [20]. If the data used has an interval or ratio scale, it is called moment or person product correlation. The rationale for product-moment correlation analysis is the change between variables, which means that if a change follows a difference in a variable in another variable, then the two variables are correlated.

According to Nugroho, Akbar, and Vusvitasari (2008), in parametric statistics, the Pearson product-moment correlation coefficient, called r , is the most commonly used [21]. The formula r is as follows:

Sample Correction, coefficient between x and y

$$r_{xy} = \frac{S_{xy}}{S_x S_y} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{(\sum (x_i - \bar{x})^2)(\sum (y_i - \bar{y})^2)}}$$

Where, $S_x, S_y \rightarrow$ Sample Standard Deviation
 $S_{xy} \rightarrow$ Sample Covariance
 $\bar{x}, \bar{y} \rightarrow$ Sample Mean

Fig. 1. Correlation Analysis Formula

The correlation coefficient has a positive or negative value, ranging from -1 to 1. A positive value indicates a positive correlation coefficient and a negative value indicates a negative correlation coefficient. Table 1 shows the interpretation of the correlation coefficient.

Table 1. Correlation Coefficient Interpretation

Correlation Coefficient (Positive or Negative)	Correlation Coefficient Interpretation
0.00 – 0.199	Very Low
0.20 – 0.399	Low
0.40-0.599	Strong Enough
0.60 – 0.799	Strong
0.80 – 1.00	Very Strong

3 Result

3.1 Implementation of Interactive Learning Multimedia for Teachers

The implementation of interactive learning multimedia has helped improve the quality of early childhood learning. This is shown by the percentage results of the use of interactive multimedia in schools that teachers often use for classroom learning presented in the diagram below:

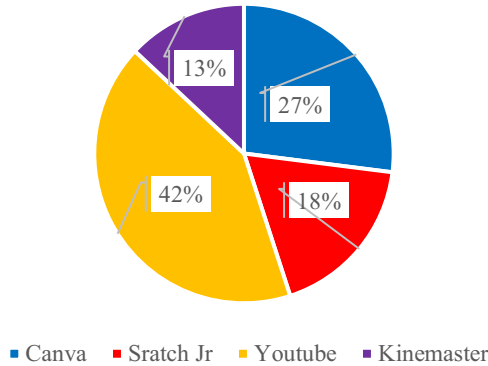


Fig. 2. Interactive Learning Multimedia Diagram of Use

Based on the results of the implementation of interactive learning multimedia, it is found that 42% of teachers in early childhood education are still loyal to using YouTube as interactive learning multimedia in early childhood education. The YouTube application provides access to diverse educational content, including exciting and engaging learning by the needs and themes applied at school at that time. In addition, visualization in the YouTube application helps strengthen children's understanding of learning materials; interactive features also encourage children to actively participate in learning and increase children's learning motivation [22], [23], [24]. The advantage of this application is that it can be accessed flexibly both online and offline according to user needs [25]. These things underlie many early childhood education teachers using YouTube applications as a means of interactive learning multimedia. Furthermore, as many as 27% of early childhood education teachers use the Canva application to support classroom learning quality. This is supported by the opinion of teachers who find it easy to use the Canva application in supporting learning in the classroom, such as by creating presentations and posters as well as story media that is interesting for children [26].

Early childhood education teachers, as much as 18%, have also utilized the Scratch Jr application in learning activities in the classroom. The use of Scratch Jr application by teachers increases the ability of teachers to master simple programming to create a game suitable for early childhood [27]. In addition, using the application, teachers can improve children's cognitive abilities in problem-solving, logical thinking, and creativity in completing game missions [28]. On the other hand, 13% of teachers utilize the Kinemaster application in classroom learning to create a learning video on the theme of the day by combining several videos and photos to support teachers in conveying the purpose of learning at that time in the classroom [29][30]. Overall, the implementation of interactive learning multimedia has helped to improve the quality of early childhood learning. It creates a more engaging learning experience, facilitates better concept understanding, encourages active student participation, supports diverse learning styles, and improves information retention. By developing and integrating this technology into the learning process, early childhood education teachers can provide more effective and enjoyable education for students.

3.2 Correlation Analysis

A simple correlation analysis was conducted to see how closely interactive learning multimedia relates to the quality of teacher teaching. After data processing using SPSS version 27, the results can be seen in Table 3 below.

Table 2. Results of Simple Correlation Analysis

		Interactive Multimedia Learning	Teacher Quality
Interactive Multimedia Learning	Pearson Correlation	1	.963**
	Sig. (2-tailed)		.000
	N	50	50
Teacher Quality	Pearson Correlation	.963**	1
	Sig. (2-tailed)	.000	
	N	50	50

** . Correlation is significant at the 0.01 level (2-tailed).

In the output above, there is a correlation cell for interactive learning multimedia with teacher quality, where there are several numbers with the following explanation:

1. The number 0.963 shows the amount of the product-moment correlation coefficient with a two-star sign (**). The symbol indicates that the correlation coefficient is significant at the 0.01 significance level.
2. The number 0.000 indicates the level of significance. Because the significance level is less than 0.001, the correlation between interactive learning multimedia and teacher teaching quality is significant.
3. The number 50 indicates the sample size or the number of observations in this study.

Based on the output value, it is known that interactive learning multimedia has a close relationship with improving the quality of teaching of early childhood education teachers, indicated by a result of 0.963 with a positive value. This shows that there is a parallel relationship between the two variables. This means that if interactive learning multimedia is not applied, the quality of teaching carried out by teachers will decrease. If interactive learning multimedia is used in early childhood learning, it will improve the quality of education carried out by teachers.

To determine the correlation between interactive multimedia by looking at the level of significance with a value of 0.000, which is less than 0.001, indicates a significant relationship between interactive learning multimedia and the quality of teaching of early childhood education teachers in Surakarta City. This shows that interactive learning multimedia and teacher-teaching quality are significantly correlated. In terms

of enrichment of learning content, Interactive learning media has many resources and learning content that can be used by teachers working with early childhood [31]. To present learning materials engagingly and interactively, teachers can use sounds, images, videos, and animations [32]. For example, by using engaging animated videos, teachers can introduce language, math, or science concepts visually, which helps children understand the concepts better and increases their interest in learning.

Interactive learning multimedia allows children to learn through hands-on experience and actively participate in the learning process [33][34]. Children can develop a deeper understanding of concepts by manipulating virtual objects, answering interactive questions, or participating in simulations. They can see abstract concepts become more concrete and relate them to real experiences [35], [36]. For example, through interactive applications featuring animal life, children can learn about the characteristics of animals, their habitats, and their interactions within the environment naturally and memorably. In addition, interactive learning multimedia offers a more engaging and challenging learning experience for children. Interactive elements such as buttons, answer selection, or game-based tasks motivate children to participate in learning actively. The use of interactive learning multimedia can help develop children's cognitive and social-emotional skills. Children are introduced to problem-solving, critical thinking, logic, and computational thinking skills through interaction with interactive content.

4 Conclusion

Based on the results of the research that has been conducted, it can be concluded that interactive learning multimedia significantly contributes to improving the quality of early childhood education teachers in carrying out learning in the classroom. Based on a simple correlation analysis, the results show that interactive multimedia has a positive significant relationship to the quality of teaching of early childhood education teachers, with a correlation coefficient value of 0.963.

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References

1. E. Etokabeka, J. van Heerden, and H. du Preez, "Exploring South African preschool teachers' roles and responsibilities with executive functions," *South African J. Child. Educ.*, 2022, doi: 10.4102/sajce.v12i1.1141.
2. A. Drigas, G. Kokkalia, and M. D. Lytras, "Mobile and multimedia learning in preschool education," *Journal of Mobile Multimedia*. 2015.
3. X. Wang, H. Sun, and L. Li, "An innovative preschool education method based on computer multimedia technology," *Int. J. Emerg. Technol. Learn.*, 2019, doi: 10.3991/ijet.v14i14.10714.
4. K. Iroda Valijonovna, "Multimedia Technologies and Their Use in the System of Preschool Education," *J. Ethics Divers. Int. Commun.*, 2022.
5. R. E. Mayer, "Using multimedia for e-learning," *Journal of Computer Assisted Learning*. 2017. doi: 10.1111/jcal.12197.
6. D. H. Jonassen, "Design problems for secondary students," *Natl. Cent. Eng. Technol. Educ.*, 2011.
7. R. B. Kozma, "Learning with Media Robert B. Kozma University of Michigan," *Rev. Educ. Res.*, 1991.
8. R. E. M. Ruth Colvin Clark, *E-Learning and the Science of Instruction*. USA: Wiley, 2016.
9. M. Jasmy, A. Rahman, M. Ali, and M. T. Sinau, "21st Century Learning in Rural Preschools: Development of Early Literacy," in *Global Conferences Series: Social Sciences, Education and Humanities (GCSSEH)*, 2020.
10. M. J. A. Rahman, M. T. Sinau, and N. K. Ensinau, "The level of readiness among rural school teacher in improving the language skills of preschool children by using the multimedia," *Univers. J. Educ. Res.*, 2020, doi: 10.13189/ujer.2020.082109.
11. I. Cemil, "A digital storytelling study project on mathematics course with preschool pre-service teachers," *Educ. Res. Rev.*, 2015, doi: 10.5897/err2015.2247.
12. E. Anisimova and R. Ibatullin, "Project method in preparation of future preschool teachers," *J. Soc. Stud. Educ. Res.*, vol. 9, no. 2, pp. 228–238, 2018, doi: 10.17499/jsser.73355.
13. V.P.Kulagin, "Problems of multimedia education," *Perspect. Sci. Educ.*, 2013.
14. W. E. Putra, D. Setiawan, Y. Yuliusman, and L. E. Fitri, "Penerapan Iptek Bagi Peningkatan Kapasitas Dan Kualitas Guru Tk Di Desa Nyogan Melalui Sistem Pembelajaran Berbasis Multimedia," *J. Karya Abdi Masy.*, 2021, doi: 10.22437/jkam.v4i3.11569.
15. U. Nafi'ah, A. Sapto, J. Sayono, and A. Herdiani, "Peningkatan Kapasitas Guru dalam Mengembangkan Media Pembelajaran Berbasis Augmented Reality untuk Menyelaraskan Pembelajaran Sejarah dengan Kebutuhan Masa Kini," *Hist. J. Pendidik dan Peneliti Sej.*, 2022, doi: 10.17509/historia.v5i1.38950.
16. U. E. E. Rasmani, A. Rahmawati, W. Palupi, J. Jumiatmoko, N. S. Zuhro, and A. Fitrianingtyas, "Manajemen Soft skills Guru dalam Memperkuat Mutu Pembelajaran di PAUD," *J. Obs. J. Pendidik. Anak Usia Dini*, 2021, doi: 10.31004/obsesi.v6i2.1584.
17. D. Sihombing and H. Samosir, "Optimalisasi peran manajemen berbasis sekolah dalam peningkatan mutu pendidikan," *JPPI (Jurnal Penelit. Pendidik. Indones.)*, 2021, doi: 10.29210/020211263.
18. R. J. Yuhan *et al.*, "Peningkatan Kapasitas Kurikulum 2013 Pendidikan Usia Dini Pada Guru dan Pengelola PAUD Al Birru Nasyiatul Aisyiyah," *J. Dedicators Community*, 2020, doi: 10.34001/jdc.v3i3.1034.

19. N. Purwandari, R. A. Kristantini, H. Hernalia, and M. Djulfikri, "Program Peningkatan Kapasitas Dan Kemampuan Guru Sekolah Dasar Dalam Pemanfaatan Teknologi Internet," *J. Pengabd. Teratai*, 2020, doi: 10.55122/teratai.v1i2.154.
20. D. Priyatno, "Analisis Korelasi, Regresi Dan Multivariate Dengan SPSS," *Statistika*, 2013.
21. R. Vusvitasari, S. Nugroho, and S. Akbar, "Kajian Hubungan Koefisien Korelasi Pearson (ρ), Spearman-Rho (r), Kendall-Tau (τ), Gamma (G), dan Somers (d_{yx})," *J. Stat.*, 2018.
22. T. Suningsih, Y. Rahelly, and Rukiyah, "Development of Interactive Multimedia on Material Introduction the Wild Animal in Kindergarten: Research and Development in Early Childhood Teacher Education Program," 2020. doi: 10.2991/assehr.k.200715.001.
23. F. E. Z. Monsef, "The communicative relationship between preschool educators and children during the quarantine period (COVID-19) through technological media the axis of education," *RIMAK Int. J. Humanit. Soc. Sci.*, 2021, doi 10.47832/2717-8293.2-3.18.
24. D. J. Holloway, L. Green, and K. Stevenson, "Digitods: Toddlers, Touch Screens and Australian Family Life," *M/C J.*, 2015, doi: 10.5204/mcj.1024.
25. R. K. D. Pecay, "Youtube integration in science classes: Understanding its roots, ways, and selection criteria," *Qual. Rep.*, 2017, doi: 10.46743/2160-3715/2017.2684.
26. E. Elsa and K. Anwar, "The Perception of Using Technology Canva Application as a Media for English Teacher Creating Media Virtual Teaching and English Learning in Loei Thailand," *J. English Teaching, Lit. Appl. Linguist.*, 2021, doi: 10.30587/jetlal.v5i1.2253.
27. R. Silva, B. Fonseca, C. Costa, and F. Martins, "Fostering computational thinking skills: A didactic proposal for elementary school grades," *Educ. Sci.*, 2021, doi: 10.3390/educsci11090518.
28. A. Haryudin and F. Imanullah, "The utilization of kinemaster applications in the making of multimedia teaching materials for English e-learning in new normal (COVID-19)," *Proj. (Professional J. English Educ.)*, 2021, doi 10.22460/project.v4i2.p341-352.
29. Z. Kourtis, C. A. Michalakopoulos, P. G. Bagos, and E. A. Paraskevopoulou-Kollia, "Computational Thinking in Preschool Age: A Case Study in Greece," *Educ. Sci.*, 2023, doi: 10.3390/educsci13020157.
30. E. Sulasmi, "Primary School Teachers' Digital Literacy: An Analysis On Teachers' Skills In Using Technological Devices," *J. Innov. Educ. Cult. Res.*, 2022, doi: 10.46843/jiecr.v3i2.81.
31. Matilde Bolaño-García, "Functions of interactive multimedia tools in preschool teaching," *Praxis (Bern. 1994)*, 2017, doi: <http://dx.doi.org/10.21676/23897856.2063>.
32. Borova, "Usage of multimedia presentations in preparation of the future preschool teachers for children's speech development," *Sci. Bull. KRHPA*, no. 12, pp. 83–92, 2020, doi: 10.37835/2410-2075-2020-12-9.
33. C. D. Voicu and F. L. Matei, "STEAM approach in primary school and preschool education," *J. Educ. Soc. Multicult.*, 2021.
34. A. Anisa N. S. Indah Septiani, I. Septiani, T. Rejekiningsih, Triyanto, and Rusnaini, "Development of interactive multimedia learning courseware to strengthen students' character," *Eur. J. Educ. Res.*, vol. 9, no. 3, 2020, doi: 10.12973/eu-jer.9.3.1267.
35. U. E. E. Rasmani, J. Widodo, and M. E. Wibowo, "A model for developing soft skill training management oriented toward service quality for shs counselors," *J. Educ. Dev.*, 2017.
36. U. E. E. Rasmani, N. E. Nurjanah, J. Jumiatmoko, Y. K. W. Widiastuti, P. Agustina, and M. D. P. Nazidah, "Multimedia Interaktif PAUD dalam Perspektif Merdeka Belajar," *J. Obs. J. Pendidik. Anak Usia Dini*, 2022, doi: 10.31004/obsesi.v6i5.2962.

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