

THE EFFECT OF ICT-BASED INTERACTIVE LEARNING MEDIA ON CREATIVITY AMONG PRIMARY SCHOOL TEACHER EDUCATION STUDENTS AT STKIP PANGERAN ANTASARI

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ABSTRACT

Keywords: Creativity, ICT, Interactive Learning Media, Primary School Teacher Education Students, Teacher Education

This study aimed to examine the effect of interactive learning media based on Information and Communication Technology (ICT) on the creativity of students in the Primary School Teacher Education Program at STKIP Pangeran Antasari. This study employed a quantitative approach using a quasi experimental method with a *nonequivalent control group* design. The participants consisted of 60 students, including 30 students in the experimental group and 30 students in the control group. The experimental group received learning through ICT based interactive learning media, while the control group received conventional learning media. Students' creativity data were collected through tests and product assessments based on the indicators of fluency, flexibility, originality, and elaboration. The results showed that the mean posttest score of the experimental group was 84.63, while the control group obtained a mean score of 74.17. The *N Gain* score of the experimental group was 0.57, compared with 0.29 for the control group. The results of the *Independent Samples t Test* showed a significance value of $0.000 < 0.05$, indicating a significant difference in creativity between the experimental and control groups. Therefore, the use of ICT based interactive learning media had a significant effect on the creativity of students in the Primary School Teacher Education Program at STKIP Pangeran Antasari and can serve as an alternative learning approach for developing the creative abilities of prospective primary school teachers.

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan media pembelajaran interaktif berbasis Teknologi Informasi dan Komunikasi (TIK) terhadap kreativitas mahasiswa PGSD STKIP Pangeran Antasari. Penelitian menggunakan pendekatan kuantitatif dengan metode eksperimen semu dan desain *nonequivalent control group*.

Subjek penelitian berjumlah 60 mahasiswa yang terdiri atas 30 mahasiswa kelompok eksperimen dan 30 mahasiswa kelompok kontrol. Kelompok eksperimen memperoleh pembelajaran menggunakan media pembelajaran interaktif berbasis TIK, sedangkan kelompok kontrol memperoleh pembelajaran dengan media konvensional. Data kreativitas mahasiswa diperoleh melalui tes dan penilaian produk berdasarkan indikator kelancaran, keluwesan, keaslian, dan elaborasi. Hasil penelitian menunjukkan bahwa rata-rata nilai *posttest* kelompok eksperimen sebesar 84,63, sedangkan kelompok kontrol sebesar 74,17. Nilai *N Gain* kelompok eksperimen sebesar 0,57, sementara kelompok kontrol sebesar 0,29. Hasil uji *Independent Samples t Test* menunjukkan nilai signifikansi sebesar $0,000 < 0,05$, sehingga terdapat perbedaan kreativitas yang signifikan antara kelompok eksperimen dan kelompok kontrol. Dengan demikian, penggunaan media pembelajaran interaktif berbasis TIK berpengaruh signifikan terhadap kreativitas mahasiswa PGSD STKIP Pangeran Antasari dan dapat menjadi alternatif pembelajaran dalam mengembangkan kemampuan kreatif calon guru sekolah dasar.

Kata kunci: Kreativitas, Mahasiswa Pgsd, Media Pembelajaran Interaktif, Pendidikan Guru Sekolah Dasar, TIK

INTRODUCTION

The development of Information and Communication Technology (ICT) has brought about fundamental changes in educational practices, including higher education, which plays an important role in preparing prospective teachers. The use of technology in learning is no longer limited to the use of computers as tools for delivering instructional materials but has evolved into an integral part of the pedagogical process that enables more interactive, flexible, collaborative, and twenty-first-century competency-oriented learning experiences. These changes require teacher education institutions to prepare students to use technology appropriately while also being able to integrate it with instructional strategies. In the context of teacher education, digital competence is essential because teachers are expected not only to be able to use technology but also to understand how technology can be utilized to support the achievement of learning objectives (Akbar & Biyanto, 2022). Studies of prospective teachers in Indonesia have demonstrated that digital competence plays an important role in preparing future educators to respond to an increasingly digitalized educational environment.

These changes have increasingly significant implications for students in the Primary School Teacher Education (PGSD) Program. PGSD students are prospective elementary school teachers who will work with learners characterized by diverse cognitive, social, emotional, and technological backgrounds. Therefore, prospective elementary school teachers need to possess the ability to design learning experiences that are not only aligned with curriculum objectives but are also engaging, interactive, contextual, and capable of providing students with opportunities to explore ideas. In this context, ICT skills need to develop alongside creativity. Technological proficiency without the ability to generate creative instructional ideas may result in digital learning that merely transfers conventional materials into electronic formats. Conversely, creativity supported by technological competence enables prospective teachers to develop more innovative learning experiences that are responsive to students' needs.

Creativity is an essential competency for prospective teachers because learning at the elementary school level requires the ability to develop various alternative strategies, media, activities, and learning resources. In an educational context, creativity is not merely associated with producing something different but also encompasses the ability to generate ideas that are novel, flexible, useful, and appropriate to the context of the problems encountered. PGSD students with high levels of creativity are expected to be able to develop instructional media by considering learners' characteristics, learning objectives, instructional content, learning environments, and technological developments. Thus, creativity represents an important foundation for developing the professionalism of prospective elementary school teachers.

The need to foster creativity among prospective teachers has become increasingly important in line with changes in the characteristics of learning in the digital era. Teachers no longer function merely as sources of information but also as designers of learning experiences that enable students to actively construct knowledge. In this context, PGSD students need learning experiences that allow them to explore various educational technologies and utilize them to produce creative instructional products. Research involving PGSD students has demonstrated that experience in designing instructional media can serve as an avenue for developing prospective teachers' creativity. Hotimah (2020), for example, found that PGSD students demonstrated increased creativity in designing instructional media after participating in project-based learning. Although this

study was conducted before the primary literature period prioritized in the present research, its findings provide a foundation for arguing that direct experience in designing instructional products is an important component in developing prospective teachers' creativity.

With subsequent technological developments, the use of technology has provided broader opportunities for students to produce interactive learning media. ICT-based interactive learning media enable the integration of various forms of information, including text, images, audio, video, animation, quizzes, simulations, and digital links into a unified learning experience. These characteristics provide students with opportunities to develop diverse ideas for presenting instructional content. The processes of selecting information, organizing visual displays, developing activities, arranging navigation, and determining forms of interaction require thinking processes that are not only technical but also creative. Therefore, the use of interactive media can be regarded as a learning environment that enables students to develop their ability to generate, combine, and modify instructional ideas.

The relevance of using interactive learning media for PGSD students is also demonstrated by the study of Elindasari et al. (2024). Their study developed technology-based interactive learning media for PGSD students in elementary school Civics education. The developed product obtained a validation score of 88.5% and was categorized as highly feasible for use. These findings indicate that the development of technology-based learning media can be meaningfully integrated into the learning experiences of PGSD students. In other words, ICT utilization is relevant not only for elementary school students but should also constitute an integral part of the learning experiences of prospective teachers.

The relationship between technology and prospective teachers' creativity is further supported by international research. Kızılay et al. (2023) examined prospective teachers' perspectives on technology-supported interdisciplinary integration and found that technology-based activities provided opportunities for prospective teachers to develop critical thinking and creativity. These findings demonstrate that technology can function not merely as a tool for information delivery but also as an environment that enables prospective teachers to explore, develop ideas, and create alternative solutions to instructional problems. Therefore, ICT integration in teacher education should be

designed around activities that position students as both users and creators of instructional products.

These findings are consistent with Chen et al. (2023), who demonstrated that prospective teachers need opportunities to design technology-based learning because the design process provides opportunities to develop creativity. Their study showed that technology-assisted instructional design activities provide prospective teachers with experiences in solving open-ended instructional problems that do not necessarily have a single solution. Such conditions are important for creativity development because students are required to consider various alternatives, evaluate choices, and produce instructional designs that are appropriate to users' needs. Therefore, the use of ICT in teacher education should extend beyond the ability to operate applications and instead be directed toward the ability to create meaningful and innovative instructional products.

This perspective is further supported by Çebi et al. (2022), who found a positive relationship between digital competence and TPACK competence among prospective teachers. Their study demonstrated that improvements in prospective teachers' digital competence were associated with the development of their ability to integrate technology with content and pedagogy. In particular, prospective teachers demonstrated development in their ability to create digital content and solve problems. These findings are relevant to the development of creativity among PGSD students because the process of creating digital learning media requires students to simultaneously integrate technological knowledge, instructional content, and pedagogical considerations.

In the Indonesian context, Akbar and Biyanto (2022) also emphasized the importance of digital competence among prospective teachers in higher education. Digital competence needs to be strengthened to ensure that prospective teachers are prepared to face an educational environment undergoing technological transformation. This indicates that teacher education should provide sufficient opportunities for students to interact with technology within instructional contexts rather than merely introducing technology as a technical skill. When students are given opportunities to design, develop, and evaluate digital learning media, such processes have the potential to foster both pedagogical skills and creativity as prospective educators.

The relationship between digital media development and creativity is also evident in the study conducted by Ummah and Azmi (2024). Research involving mathematics

education students demonstrated that students were able to develop interactive multimedia using the Kodular application and exhibited aspects of creativity, including fluency, flexibility, and originality during the media development process. Although the participants were not PGSD students, these findings are relevant because they demonstrate that designing interactive multimedia can constitute an activity that encourages students to generate and develop creative ideas. However, the study also indicated that the ability to produce useful products was not always accompanied by a high level of novelty. This finding suggests that creativity in digital media development is a competency that needs to be systematically cultivated through purposeful and structured learning experiences (Ummah & Azmi, 2024).

A study by Sari (2026), which specifically examined PGSD students, also demonstrated that creativity is an important aspect of designing mathematics teaching materials based on digital media. PGSD students are expected not only to be able to use digital devices but also to produce teaching materials that demonstrate the ability to develop ideas, select appropriate forms of presentation, and adapt media to instructional needs. These findings reinforce the argument that technological competence and creativity need to be developed simultaneously among PGSD students. Although this study falls outside the primary publication period prioritized in the present research, its findings can serve as additional evidence of the current empirical need to foster creativity among PGSD students in digital media development.

Furthermore, research by Laili et al. (2024) on the use of Canva as a digital learning medium demonstrated a positive effect of digital media use on students' creativity. The study involved 95 students and reported a positive regression coefficient of 0.572 and an R-squared value of 0.406. This indicates that the use of Canva as a digital learning medium contributed 40.6% to the variance in students' creativity within the context of the study. These findings provide empirical evidence that the use of digital applications can be associated with the development of students' creativity, particularly when technology is utilized to produce instructional products.

Although several studies have demonstrated the benefits of using digital and interactive learning media, there remains room for further research. Some studies have focused primarily on the development and validation of media products, improvements in students' learning outcomes, or the strengthening of digital competence. Meanwhile,

research specifically examining the effect of ICT-based interactive learning media on the creativity of PGSD students remains relatively limited. Moreover, studies conducted specifically within the context of PGSD students at particular higher education institutions in Indonesia require further empirical evidence. Therefore, research is needed that not only examines media feasibility or improvements in learning outcomes but specifically investigates the relationship between the use of ICT-based interactive learning media and students' creativity as prospective teachers.

This research gap is particularly relevant in the context of STKIP Pangeran Antasari. PGSD students at this institution need learning experiences that enable them to develop pedagogical competencies while also utilizing ICT creatively. The use of ICT-based interactive learning media can provide opportunities for students to explore various forms of content presentation, design learning activities, combine multimedia elements, and produce instructional products suited to the characteristics of elementary school students. Conceptually, this process can constitute a learning experience that encourages students to develop indicators of creativity, such as fluency in generating ideas, flexibility in employing different approaches, originality in producing products, and elaboration in developing ideas into more comprehensive instructional products.

Based on the foregoing discussion, research on the effect of ICT-based interactive learning media on the creativity of PGSD students at STKIP Pangeran Antasari has both academic and practical relevance. Academically, this study can enrich empirical evidence concerning the relationship between the use of educational technology and the creativity of prospective elementary school teachers. Practically, the findings can provide considerations for lecturers in designing learning experiences that utilize ICT not merely as a means of delivering instructional content but as a medium through which students can creatively produce and develop instructional products. Accordingly, this study aims to obtain empirical evidence regarding the extent to which the use of ICT-based interactive learning media affects the creativity of PGSD students at STKIP Pangeran Antasari as prospective elementary school teachers who are expected to adapt to technological developments and contemporary learning needs.

METHODS

This study employed a quantitative approach using a quasi-experimental method to examine the effect of using Information and Communication Technology (ICT)-based interactive learning media on the creativity of PGSD students at STKIP Pangeran Antasari. The research employed a nonequivalent control group design, involving two groups: an experimental group that received instruction using ICT-based interactive learning media and a control group that received instruction using conventional learning media. The participants were 60 students enrolled in the Primary School Teacher Education (PGSD) Program at STKIP Pangeran Antasari, consisting of 30 students in the experimental group and 30 students in the control group. The sample was selected using purposive sampling, based on considerations of comparable academic characteristics and equivalent instructional content received by both groups.

The study began with the administration of a pretest to both the experimental and control groups to determine the students' initial levels of creativity before the intervention. Subsequently, the experimental group participated in learning activities utilizing ICT-based interactive learning media that integrated text, images, videos, animations, interactive exercises, and exploratory activities. Students were provided with opportunities to explore the learning materials, develop ideas, design learning products, and complete tasks creatively through the use of technology. Meanwhile, the control group participated in instruction using the commonly implemented instructional approach and conventional learning media. The intervention was conducted over several instructional sessions, with both groups receiving the same learning materials and objectives. After the intervention was completed, both groups were administered a posttest to determine changes in students' creativity following the learning process.

The research instruments consisted of a creativity test and a learning product assessment rubric. Students' creativity was assessed based on several indicators: fluency, referring to the ability to generate multiple ideas; flexibility, referring to the ability to generate ideas from different perspectives; originality, referring to the ability to produce ideas or products containing elements of novelty; and elaboration, referring to the ability to develop ideas in detail and systematically. The instruments were first tested for validity and reliability to ensure their suitability for data collection. Data obtained from the pretest and posttest were analyzed using descriptive statistics to determine the mean and standard

deviation for each group. Subsequently, prerequisite tests, including normality and homogeneity tests, were conducted. If the data satisfied the assumptions of parametric analysis, hypothesis testing was performed using an Independent Samples t-test at a significance level of 0.05. The decision criterion was that a significance value of < 0.05 indicated a statistically significant effect of ICT-based interactive learning media on the creativity of PGSD students at STKIP Pangeran Antasari.

RESULTS AND DISCUSSION

This study aimed to examine the effect of using Information and Communication Technology (ICT)-based interactive learning media on the creativity of PGSD students at STKIP Pangeran Antasari. The study involved 60 students divided into an experimental group and a control group, with 30 students in each group. The experimental group received instruction using ICT-based interactive learning media, whereas the control group received instruction using conventional learning media. Students' creativity was measured through pretests and posttests based on the indicators of fluency, flexibility, originality, and elaboration.

The descriptive analysis revealed differences in students' creativity before and after the learning intervention. The mean pretest and posttest scores for both groups are presented in Table 1.

Table 1. Descriptive Statistics of Students' Creativity

Group	N	Pretest Mean	SD	Posttest Mean	SD	N-Gain
Experimental	30	64.27	7.18	84.63	6.21	0.57
Control	30	63.80	7.46	74.17	6.87	0.29

Based on Table 1, the mean pretest score of the experimental group was 64.27, while that of the control group was 63.80. The difference in the initial abilities of the two groups was relatively small, at only 0.47 points. Following the intervention, the mean posttest score of the experimental group increased to 84.63, whereas the control group achieved a mean score of 74.17. Thus, the mean increase in the experimental group was 20.36 points, compared with 10.37 points in the control group. The N-gain score of the experimental group was 0.57, while that of the control group was 0.29. These findings indicate that the improvement in creativity among students who received instruction using

ICT-based interactive learning media was greater than that among students who received conventional instruction.

Creativity was also analyzed based on the four indicators employed in the study. The results are presented in Table 2.

Table 2. Mean Creativity Scores by Indicator

Creativity Indicator	Experimental Pretest	Experimental Posttest	Control Pretest	Control Posttest
Fluency	64.80	86.40	64.20	75.10
Flexibility	63.70	83.90	63.50	73.60
Originality	62.90	82.70	63.10	72.50
Elaboration	65.70	85.50	64.40	75.50
Mean	64.28	84.63	63.80	74.18

Table 2 demonstrates that all creativity indicators improved following the learning intervention. In the experimental group, the greatest improvement occurred in the fluency indicator, which increased from 64.80 to 86.40. This finding indicates that the use of ICT-based interactive media provided students with greater opportunities to generate multiple ideas when completing learning tasks. Meanwhile, the originality indicator increased from 62.90 to 82.70. This improvement suggests that students were not only able to generate a greater number of ideas but also began to develop more diverse ideas containing elements of novelty.

Before hypothesis testing was conducted, the posttest data were first examined for normality and homogeneity. The results are presented in Table 3.

Table 3. Results of the Normality and Homogeneity Tests

Test	Significance Value	Criterion	Conclusion
Normality – Experimental Group	0.200	> 0.05	Normally Distributed
Normality – Control Group	0.184	> 0.05	Normally Distributed
Homogeneity	0.327	> 0.05	Homogeneous

As shown in Table 3, the significance value of the normality test was 0.200 for the experimental group and 0.184 for the control group. Both values were greater than 0.05, indicating that the data were normally distributed. The homogeneity test yielded a

significance value of $0.327 > 0.05$, indicating that the variances of the two groups were homogeneous. Since both prerequisites were satisfied, the analysis proceeded using an Independent Samples t-test.

Table 4. Results of the Independent Samples t-Test

Variable	t Value	df	Sig. (2-tailed)	Decision
Student Creativity	6.251	58	0.000	Reject H_0

Based on Table 4, the calculated t value was 6.251 with 58 degrees of freedom (df) and a significance value of $0.000 < 0.05$. Therefore, H_0 was rejected and H_1 was accepted. These results indicate a statistically significant difference in creativity between students who participated in learning using ICT-based interactive learning media and those who received instruction using conventional media. In other words, the use of ICT-based interactive learning media had a statistically significant effect on the creativity of PGSD students at STKIP Pangeran Antasari.

The improvement in creativity among students in the experimental group can be understood in terms of the characteristics of ICT-based interactive learning media, which provide students with opportunities to interact directly with learning materials and develop multiple alternative ideas. Interactive media do not merely present information in a one-way format but enable students to explore learning materials through a combination of text, images, videos, animations, exercises, and digital activities. Such conditions create a more dynamic learning experience, allowing students to experiment with, modify, and develop ideas throughout the learning process. This finding is consistent with Çebi et al. (2022), who explained that prospective teachers' digital competence is associated with their ability to integrate technology into learning and develop more complex knowledge through the use of technology.

The results also revealed that the fluency indicator experienced the greatest improvement in the experimental group. This finding suggests that ICT-based interactive media can encourage students to generate more ideas when dealing with learning tasks. The availability of diverse digital resources and forms of information representation provides more varied stimuli, preventing students from relying on a single approach to solving problems. This condition is consistent with Kızılay et al. (2023), who found that technology integration in learning can provide an environment that supports the development of creativity and higher-order thinking skills among prospective teachers.

Regarding the flexibility indicator, students in the experimental group also demonstrated greater improvement than those in the control group. The use of digital media enabled students to experience learning through various forms of representation and activities. Students could examine learning materials from different perspectives, select appropriate solution strategies, and adapt their ideas to the requirements of the tasks. These processes contributed to the development of flexible thinking. This finding is consistent with Chen et al. (2023), who demonstrated that technology-assisted design activities provide prospective teachers with opportunities to explore various alternatives and develop creativity in addressing instructional problems.

The improvement in the originality indicator further indicates that ICT-based interactive learning media not only helped students generate a greater number of ideas but also encouraged the emergence of more unique ideas. When students were given opportunities to design or modify learning products using technology, they needed to determine designs, visual presentations, content, and activities that aligned with their individual ideas. This process can stimulate students to produce products that differ from the examples provided. These findings support the study by Laili et al. (2024), which reported a positive effect of digital media use on students' creativity.

Meanwhile, the improvement in the elaboration indicator indicates that students were able to develop initial ideas into more detailed learning products or instructional designs. The use of interactive media allowed students to move beyond simple ideas by developing them through the addition of illustrations, videos, animations, questions, exercises, and learning activities. This ability is important for PGSD students because prospective teachers need not only to possess instructional ideas but also to translate those ideas into learning experiences that can be implemented with elementary school students. This finding is consistent with Elindasari et al. (2024), who demonstrated that technology-based interactive learning media can be developed and implemented in the context of learning for PGSD students.

The differences in outcomes between the experimental and control groups also indicate that the use of technology alone is not the primary determining factor; rather, its impact depends on how technology is integrated into learning activities. In the experimental group, students did not merely receive learning materials through digital devices but were actively engaged in exploration and product development activities.

Thus, ICT functioned as a tool for creating, developing, and communicating ideas. This finding reinforces the view of Çebi et al. (2022) that prospective teachers' digital competence needs to be integrated with pedagogical and content knowledge so that technology can generate more meaningful impacts on learning.

Overall, the findings demonstrate that the use of ICT-based interactive learning media can serve as an alternative approach for developing the creativity of PGSD students at STKIP Pangeran Antasari. The higher posttest scores, greater N-gain, and results of the Independent Samples t-test with a significance value of 0.000 indicate a statistically significant effect. These findings demonstrate that thoughtfully designed ICT-based interactive learning can help prospective teachers develop the ability to generate ideas, view problems from multiple perspectives, create more original ideas, and transform ideas into more comprehensive learning products. Therefore, the use of ICT-based interactive learning media should continue to be developed in PGSD learning as part of efforts to prepare prospective teachers who are creative, adaptive, and capable of responding to the demands of learning in the digital era.

CONCLUSION

Based on the findings of this study, it can be concluded that the use of Information and Communication Technology (ICT)-based interactive learning media has a significant effect on the creativity of PGSD students at STKIP Pangeran Antasari. The mean posttest score of the experimental group was 84.63, which was higher than that of the control group (74.17), with N-gain scores of 0.57 and 0.29, respectively. The results of the Independent Samples t-test showed a significance value of $0.000 < 0.05$, indicating a statistically significant difference in creativity between the two groups. Therefore, the use of ICT-based interactive learning media can serve as an effective instructional alternative for developing students' fluency, flexibility, originality, and elaboration of creativity as prospective elementary school teachers.

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