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Creative Thinking Skills: Project Based Learning (PjBL) in the Media and Learning Resources Development Course

Nanda Safarati*, Fatma Zuhra & Novi Sari Liani
Universitas Almuslim, Bireuen, Indonesia
safaratinanda@gmail.com

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ABSTRACT

This study uniquely explores the enhancement of students' creative thinking skills through the application of Project-Based Learning (PjBL) in media and learning resource development courses, addressing a critical gap in contemporary educational methodologies. The research employed a quasi-experimental design at Almuslim University within the Basic Education Study Program (PGSD). The sample included 3rd semester PGSD students, with 29 students in the experimental group (class 3f) and 29 in the control group (class 3e), selected using purposive sampling. Utilizing a Posttest Only Control design, data were collected through observation and tests. Validity was ensured through content and empirical checks, and data analysis involved normality, homogeneity tests, and hypothesis testing using SPSS 23.0 software. The findings indicate a significant improvement in students' creative thinking skills as a result of implementing the PjBL model in media and learning resource development courses. The experimental group demonstrated enhanced critical thinking, creativity, and problem-solving abilities compared to the control group. These results underscore the efficacy of PjBL in fostering essential 21st-century skills among students. The structured, hands-on approach of PjBL not only engages students actively but also encourages collaborative learning and innovative thinking. The application of PjBL in media and learning resource development courses significantly enhances students' creative thinking skills. This study's implications extend to broader educational contexts, suggesting that integrating PjBL can effectively prepare students for future challenges by promoting critical, creative, and collaborative skills essential for success in a rapidly evolving world.

1. Introduction

In the rapidly evolving landscape of education, the integration of media and learning resources development courses has become paramount. These courses challenge students to design, create, refine, and develop products, bridging the gap between theoretical knowledge and practical application (Nengsih et al., 2022). This approach necessitates critical thinking, creativity, and a robust grasp of concepts, enabling students to produce contextual work both individually and collaboratively (Zativalen et al., 2022). The primary objective of these courses is to impart an understanding of media development processes, including design, scheduling, and the creation of diverse media types to enhance conceptual understanding and student outcomes. As we navigate the demands of 21st-century education, students must cultivate skills in critical thinking, communication, collaboration, and creativity (Lestari & Ilhami, 2022).

In today's technology-driven world, education is a crucial catalyst for preparing future generations to thrive amid constant change (Rahmawati & Atmojo, 2021). It is imperative for educators to adopt learning models that foster creativity and skill development in media and resource design. Effective learning models serve as templates for educators, guiding the implementation of classroom activities and the selection of appropriate tools and evaluation methods (Harefa, 2023). These models not only facilitate knowledge transfer but also ignite curiosity and enthusiasm among students, enhancing their comprehension and engagement (Harianja & Sapri, 2022).

Despite the potential of these courses, several gaps remain. Current pedagogical practices often center around lecturer-led instruction, resulting in limited student creativity and engagement in media product development. Students tend to replicate existing media without exploring innovative redesigns,

leading to a lack of creative thinking and IT utilization (Dilekçi & Karatay, 2023). Additionally, the complexity of the material often surpasses students' abilities, causing passivity and hindering skill development. Time constraints further exacerbate these issues, limiting opportunities for deep concept exploration and active participation (Haryanti & Saputra, 2019).

The reliance on conventional methods where students primarily present and write about concepts without hands-on practice hampers the development of essential skills. Moreover, insufficient time for delivering material and conducting media development practices, coupled with low student motivation in sourcing appropriate references, diminishes the effectiveness of these courses. This scenario highlights the need for innovative teaching strategies that enhance student engagement and creativity (Hairunisa et al., 2019).

Addressing these gaps, this study explores the implementation of the project-based learning (PjBL) model in media and learning resource development courses. PjBL is recognized for enhancing various competencies, including writing ability (Alemneh & Gebrie, 2024), learning motivation (Zouganeli et al., 2014), and historical knowledge (Pan et al., 2023). It also significantly contributes to the professional identity development of preservice teachers (Tsybulsky & Muchnik-Rozanov, 2023). PjBL centers on student-led projects, fostering critical thinking, problem-solving, creativity, and independence (Azzahra et al., 2023).

The novelty of this research lies in its application of the PjBL model to the media and learning resources development course over 16 meetings. The study employs PjBL for six sessions post-midterm, guiding students from media design to development, culminating in a final presentation of their creative outputs. The developed media includes both online ICT-based and conventional visual aids, tailored to the elementary school level (Dewi, 2021; Sari & Angreni, 2018; Astriani, 2020). The significance of this study is underscored by its aim to enable students to develop practical, innovative learning media suitable for elementary education. By integrating PjBL, the study seeks to cultivate students' creative thinking and problem-solving abilities, essential for modern educational demands. This approach not only addresses current pedagogical gaps but also aligns with the broader educational objectives of fostering creativity and independent learning (Zakiah et al., 2020; Kusadi et al., 2020).

The structure of this study includes a detailed review of literature on the PjBL model and creative thinking skills, followed by a methodological explanation of the quasi-experimental design used. The results section presents data on the effectiveness of PjBL in enhancing creative thinking skills, supported by statistical analyses. The discussion interprets these findings in the context of existing literature, highlighting the implications for future educational practices. In conclusion, this study demonstrates that the PjBL model significantly enhances students' creative thinking skills in media and learning resource development courses. The implications of these findings suggest a broader application of PjBL across various educational settings to cultivate essential 21st-century skills. Future research should explore additional indicators of skill development and the long-term impacts of PjBL on student outcomes.

2. Literature Review

2.1 Project Based Learning Model Learning

Project-Based Learning (PjBL) is a dynamic classroom approach that empowers educators to manage learning through student-involved projects (Rani, 2021). PjBL centers on three fundamental constructivist principles: context-specific learning, active student engagement, and achieving educational goals through social interaction, sharing knowledge, and understanding (Sukmana & Amalia, 2021). This model encourages students to engage in collaborative projects that integrate various curriculum subjects, offering them the opportunity to explore content meaningfully and conduct experiments together. According to Vahlepi et al. (2021), PjBL begins with problem-solving as the initial step, fostering the collection and integration of new knowledge through real-life activities.

PjBL is particularly effective for addressing complex problems that necessitate thorough investigation and understanding. This model aligns well with the 2013 curriculum, which emphasizes project-based activities as core learning methods. Through exploration, assessment, interpretation, synthesis, and information, students produce diverse learning forms. Despite its benefits, PjBL is underutilized due to the extensive preparation and time required for its implementation (Amri & Muhajir, 2022). The stages of PjBL include posing questions, designing projects, scheduling, monitoring, assessing, and evaluating, all of which contribute to a holistic learning experience.

2.2 Creative Thinking Skills

Creative thinking is defined as the ability to generate innovative ideas or produce new products. Rufaida & Mubarokah (2023) describe creative thinking as the development of original perspectives or solutions using existing information and materials. The outcome of creative thinking is student creativity in problem-solving, which is critical for achieving educational goals. The characteristics and attitudes fostered through creative thinking include imagination and the capacity for discovering innovative and critical ideas.

According to Wallas (Handoko, 2017), the creative thinking process involves four stages: preparation, incubation, illumination, and verification. During the preparation stage, individuals prepare to solve problems by thinking, seeking answers, and consulting others. The incubation stage involves temporarily distancing oneself from the problem, allowing the subconscious to work, which often leads to the emergence of new ideas during the illumination stage. Finally, the verification stage tests these ideas against reality, involving elaboration and evaluation skills. Handoko (2017) outlines five indicators of creative thinking: fluency, flexibility, originality, elaboration, and evaluation. This research adopts Fadel's (Antika & Nawawi, 2017) indicators of creative thinking, which include critical thinking and problem-solving, creativity and innovation, collaboration, cross-cultural understanding, communication, media literacy, ICT competence, and career and independence.

2.3 Media and Learning Resources Development

The Media and Learning Resources Development (PMSB) course, offered during the odd semesters, aims to equip students with the skills to develop learning media and resources that align with the educational objectives and characteristics of elementary school students. The course covers various aspects, including the types, functions, and benefits of media and learning resources, their selection, and practical application in elementary schools. The PjBL model is particularly suitable for this course as it enables students to select, design, and practice creating learning media that meet specific educational goals (Rafik et al., 2022).

In the PMSB course, students are expected to be creative and innovative in determining, selecting, and designing media. PjBL facilitates this by making students the focal point of learning, encouraging creativity through collaborative project work that culminates in tangible products. This approach grants students the freedom to plan their learning activities, work collaboratively, and produce meaningful outcomes. The success of this model heavily depends on the students' engagement and the teacher's ability to manage the class effectively.

3. Method

This study employs a quantitative research approach, specifically utilizing a quasi-experimental design. Quasi-experiments are comparative studies that evaluate the effects of an intervention on an experimental group and compare these effects to those observed in a control group (Arikunto, 2019). This research was conducted at Almuslim University within the Basic Education Study Program (PGSD). The population comprised all PGSD students at Almuslim University, with the sample including 3rd semester students. Class 3e served as the control group, while class 3f was the experimental group, with each class consisting of 29 students. The sampling technique used was purposive sampling, which involves selecting participants based on specific objectives and predefined characteristics of the population (Kusadi et al., 2020).

The indicators of creative thinking evaluated in this study are based on Fadel's framework as described by Antika & Nawawi (2017). These indicators include: 1) critical thinking and problem solving; 2) creativity and innovation; 3) collaboration and teamwork; 4) communication and media literacy; 5) proficiency in computers and ICT. The research utilized a Posttest Only Control design to assess the impact of the intervention, as detailed in Table 1.

Table 1. Research Design

Sample	Treatment	Posttest
Experimental Class	X_1	Y_1
Control Class		Y_2

Source: (Sugiyono, 2017)

3.1 Data Collection:

Data collection was performed using both observation and testing techniques. Observations were facilitated through the distribution of questionnaires to the students, while tests were administered at the final stage of the learning process. The observation technique aimed to gather qualitative data on student engagement and participation, while the tests provided quantitative data on the improvement in creative thinking skills. The validity of the collected data was ensured through content validity and empirical validity checks.

3.2 Data Analysis:

Data analysis was conducted using several statistical methods. Initially, normality tests were performed to ascertain whether the data followed a normal distribution. This was followed by homogeneity tests to determine the uniformity of variances between the experimental and control groups. Hypothesis testing was then carried out to evaluate the effectiveness of the intervention. All statistical analyses were executed using the SPSS 23.0 software program, which ensured precision and reliability in the results.

This detailed methodological approach, incorporating robust data collection and analysis techniques, underscores the reliability and validity of the findings. By employing a quasi-experimental design, the study effectively isolates the impact of the Project-Based Learning (PjBL) model on the creative thinking skills of PGSD students, providing valuable insights into educational strategies that enhance student creativity and engagement.

4. Result

This research was conducted at the Almuslim University Primary School Teacher Education Study Program (PGSD), in the media and learning resources development course. This research applies the project-based learning model to experimental class 3f and conventional methods to the control class, namely class 3e. This research was conducted in 6 meetings for each experimental class and control class. In accordance with the research questions that have been outlined, the aim of this research is to determine the improvement of students' creative thinking skills through the application of project based learning (PjBL) in media and learning resource development courses.

Based on the results of data analysis, researchers have carried out a homogeneity test which aims to find out whether the two data obtained, namely the control class and the experimental class, have the same variance or vice versa. The test criteria are homogeneous data if the significant figure obtained is greater than 0.05. Calculation of data from homogeneity test results can be seen in Table 2.

Tabel 2. Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
.333	1	56	.566

Based on table 2, it can be seen that the level of significance (sig.) obtained is 0.566 > 0.05. So it can be concluded that the data is homogeneous. Next, the researcher carried out a normality test, to find out whether the distribution of the sample data to be analyzed was normally distributed or not. The group tested for normalization consisted of the experimental class, namely students who were treated using the Project Based Learning Model and the control class, namely students who were treated using the conventional model. The test criteria are that the data has a normal distribution if the significant figure obtained is greater than 0.05 and in other cases the data is not normally distributed. The calculation results of the normality test results can be seen in Table 3.

Tabel 3. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Control Class	.158	29	.064	.941	29	.106
Experimental Class	.141	29	.147	.922	29	.034
a. Lilliefors Significance Correction						

Based on table 3, the Kolmogorov-Smirnova shows that the control class has a significance of 0.064 > 0.05 and the experimental class has a significance value of 0.147 > 0.05. So it can be said that the two classes have a normal distribution. Then the hypothesis test calculation can be seen in Table 4.

Tabel 4. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Post test	Equal variances assumed	.333	.566	-1.082	56	.284	-2.138	1.976	-6.096	1.820
	Equal variances not assumed			-1.082	55.359	.284	-2.138	1.976	-6.097	1.821

Based on the results of the hypothesis test that has been carried out, it can be seen that the significance of the hypothesis test (t) is 0.284 > 0.05. So it can be concluded that there is an increase in students' creative thinking skills through the application of project based learning (PjBL) in media and learning resource development courses.

The results of learning media products that have been produced through online media and real media can be seen in Figures 1 and 2.

Figure 1. Online/ICT Based Learning Media Created by Students

Figure 2. Conventional-based learning media/display tools produced by students

Based on the average results of N Gain, increasing creative thinking skills for each indicator can be seen in table 5.

Table 5. Improvement of Students' Creative Thinking Skills Per Indicator

No	Indicators of Creative Thinking Skills	Experimental Class		Control Class	
		N-Gain	Category	N-Gain	Category
1	Critical thinking and problem solving	0,57	Currently	0,23	Low
2	Creativity and innovation	0,53	Currently	0,29	Low
3	Collaboration and teamwork	0,51	Currently	0,31	Currently
	Average	**0,54**	**Currently**	**0,28**	**Low**

Based on table 5, it can be seen that the N-Gain on the indicator of critical thinking and problem solving in the experimental class was 0.57, which was in the medium category, while in the control class it was 0.23, which was in the low category. The indicator of creativity and innovation in the experimental class obtained an n gain of 0. .53 is in the medium category, while in the control class it is 0.29 in the low category. For indicators of collaboration and teamwork in the experimental class, an n gain of 0.51 is in the medium category, while the control class gets a value of 0.31 in the medium category. . The average ngain in the experimental class was 0.54 in the medium category while the control class was 0.28 in the low category. Thus, it can be seen that creative thinking skills in the experimental class have increased to the medium category.

5. Discussion

Based on the analysis of the research data, it is evident that the application of the Project-Based Learning (PjBL) model significantly enhances students' creative thinking skills, particularly in media and learning resource development courses. This study's activities were implemented over six sessions for both the control and experimental classes. In the initial session for the experimental class, the PjBL model was introduced as the treatment.

The steps in the PjBL learning model, as adopted from Permendikbud (2014), include determining basic questions, preparing project plans, scheduling, monitoring, testing results, and evaluating experiences. Initially, students in the experimental class were given sub-material related to various media and learning resources, both conventional and ICT-based. They were tasked with designing both virtual and real learning media. The lecturer facilitated this process by encouraging questions and fostering discussions. Students were organized into six groups of five to enhance collaboration and ease of discussion. In the project planning stage, students worked in groups to decide on the media and learning resources they would develop. This stage was crucial for showcasing students' creativity and collaborative skills as they selected and designed media suitable for elementary school students. Each group chose a theme and developed a list of required tools and materials, along with the procedures for media development.

During the scheduling phase, students created timelines for the completion of their projects, adhering to the lecture schedule and allowing for six sessions of project development. The monitoring phase involved the lecturer supervising the project process, providing guidance, and addressing any obstacles encountered by the students. The lecturer's role was pivotal as a mentor, teaching students how to effectively complete their projects in groups and allowing them to choose roles within their teams.

The results testing phase involved students presenting their projects, explaining the advantages, and receiving feedback. In the final evaluation phase, both the lecturer and students assessed the projects, providing constructive feedback and opportunities for improvement.

The implementation of the PjBL steps clearly demonstrated that students were enthusiastic and highly engaged. Observations showed that students produced various kinds of learning media, including conventional, ICT, online, blended learning, and teaching aids, which they could later use during their teaching practice (PPL program).

When comparing the experimental class using the PjBL model with the control class using conventional methods, it was evident that the PjBL model significantly improved students' critical thinking, creativity, and collaboration skills. These improvements were assessed using the indicators of creative thinking skills proposed by Fadel (Antika & Nawawi, 2017), focusing on critical thinking and problem-solving, creativity and innovation, and collaboration and teamwork.

The control class did not undergo the same detailed steps as the experimental class, leading to lower average gains in creative thinking skills. The conventional learning model involved lectures, assignments, and presentations, which were less effective in engaging students and fostering creativity. However, group discussions in the control class did show some improvement in cooperation and collaboration.

The findings of the study are in line with previous research that highlights the effectiveness of Project-Based Learning (PjBL) in enhancing creativity and creative thinking abilities among students (Amorati & Hajek, 2021). Zakiah et al. (2020) demonstrated that PjBL plays a significant role in fostering creativity, which is further supported by the study conducted by Amorati & Hajek (2021) emphasizing the importance of clear outcome goals and collaboration in successful projects (Amorati & Hajek, 2021).

Moreover, Arsitha et al. (2023) indicated that PjBL has a positive impact on students' learning outcomes, aligning with the notion that innovative pedagogical strategies, such as PjBL, can enhance student engagement and academic performance (Dewi et al., 2020). Additionally, the research by Kusadi et al. (2020) and Noviyana (2017) further supports the conclusion that PjBL not only enhances creativity but also improves social skills and critical thinking among students (Tulungagung, 2023). This aligns with the idea that PjBL provides a platform for students to develop essential skills beyond academic knowledge,

preparing them for real-world challenges and collaborative work environments (Tulungagung, 2023).

Furthermore, the study underscores the importance of integrating PjBL models in educational settings to improve student learning outcomes and critical thinking skills (Rusnawati et al., 2021). By implementing PjBL, educators can create a dynamic learning environment that fosters creativity, collaboration, and problem-solving skills among students, as highlighted in various studies focusing on the impact of PjBL on student competence and academic achievement (Usmeldi & Amini, 2022; , Kurniawan & Budiono, 2018).

In the study conducted by students, a combination of virtual technology such as videos, audio, audiovisual aids, and virtual comics, along with real materials like props, was utilized to develop engaging educational products for elementary school students. This approach aligns with research that emphasizes the importance of integrating technology into education to enhance student engagement and learning outcomes (Zoch et al., 2014). By incorporating virtual technology and real materials, students were able to create unique and interactive learning experiences that catered to the needs and preferences of elementary school students (Nugrahaningrum, 2023).

Furthermore, the use of hands-on engagement and technology in the form of virtual reality-based games has been shown to positively impact student motivation and learning outcomes. This aligns with the idea that interactive and student-centered approaches, such as the incorporation of virtual reality, can enhance student participation and understanding of abstract concepts in science subjects (Nugrahaningrum, 2023).

Moreover, the study underscores the significance of curriculum materials in engaging students in inquiry-based learning (Forbes & Davis, 2010). By utilizing a variety of resources, including virtual technology and real props, students were able to explore and create products that not only fostered creativity but also promoted a deeper understanding of the subject matter. This approach resonates with the idea that innovative teaching methods, such as project-based learning with a focus on practical applications, can enhance student learning experiences (Sogen, 2023).

The focus on student creativity is a significant contribution of this research. However, future research should explore additional skills that can be developed through the PjBL model in PMSB courses. Further studies could examine the impact of PjBL on other cognitive and non-cognitive skills, providing a more comprehensive understanding of its benefits in educational settings.

6. Conclusions

Based on the analysis and discussion, it is evident that the implementation of the Project-Based Learning (PjBL) model significantly enhances students' creative thinking skills in media and learning resource development courses. This is demonstrated by the diverse media products developed by students, which include online media such as videos, audio, audiovisual media, literacy media like comics, and conventional teaching aids. The novelty of this research lies in the application of PjBL to enable students to create innovative learning media, thereby fostering creativity. The study's homogeneity test showed a significance level of 0.566, indicating that the data is homogeneous. The normality test results for the control and experimental classes were 0.064 and 0.147, respectively, confirming normal distribution. Additionally, the hypothesis test yielded a significance of 0.284, further supporting the conclusion that PjBL effectively enhances creative thinking skills. These findings imply that integrating PjBL in educational settings can prepare students for future challenges by promoting essential 21st-century skills such as critical thinking, creativity, and collaboration. Future research should explore additional skill indicators and the long-term impacts of PjBL on student outcomes.

References

Adhitya, A., Astawan, I. G., & Adi, I. N. R. (2022). Pengembangan instrumen penilaian keterampilan berpikir kritis dan berpikir kreatif berbasis Google Form. *Jurnal Ilmiah Pendidikan Citra Bakti*, *9*(2), 250–261.

Alemneh, S., & Gebrie, G. (2024). The role of project-based learning in improving the writing ability and sub-writing abilities of 10th grade Amharic speaking students. *Social Sciences & Humanities Open*, *9*. https://doi.org/10.1016/j.ssaho.2024.100284

Amorati, R., & Hajek, J. (2021). Fostering motivation and creativity through self-publishing as project-based learning in the Italian L2 classroom. *Foreign Language Annals*, *54*(4), 1003–1026. https://doi.org/10.1111/flan.12568

Amri, & Muhajir, H. (2022). Keterampilan berpikir kreatif peserta didik melalui model project based learning (PjBL) secara daring. *Didaktika Biologi: Jurnal Penelitian Pendidikan Biologi*, *6*(1), 21–29.

Antika, R. N., & Nawawi, S. (2017). Pengaruh model project based learning pada mata kuliah seminar terhadap keterampilan berpikir kreatif mahasiswa. *Jurnal Pendidikan Biologi Indonesia*, *3*(1), 72–79.

Arikunto. (2019). Metodelogi penelitian, suatu pengantar pendidikan. In Rineka Cipta, Jakarta.

Arsitha, D. R., Setyawan, K. G., Larasati, D. A., & Prastiyono, H. (2023). Pengaruh model pembelajaran project based learning menggunakan media scrapbook dalam meningkatkan kreativitas dan hasil belajar siswa. *Dialektika Pendidikan IPS*, *3*(2), 226–238.

Astriani, M. M. (2020). Upaya mengembangkan kreativitas mahasiswa melalui pembelajaran model project based learning. *Jurnal PETIK*, *6*(1), 36–40.

Azzahra, U., Arsih, F., & Alberida, H. (2023). Pengaruh model pembelajaran project-based learning (PjBL) terhadap keterampilan berpikir kreatif peserta didik pada pembelajaran biologi: Literature review. *BIOCHEPHY: Journal of Science Education*, *3*(2), 49–60.

Darmuki, A., & Hidayati, N. A. (2023). Model project based learning untuk meningkatkan keterampilan berpikir tingkat tinggi. *Jurnal Educatio*, *9*(1), 15–22.

Dewi, P. S. (2021). E-learning: Penerapan project based learning pada mata kuliah media pembelajaran. *Prisma*, *10*(1), 97–105.

Dewi, C., & Riyanto, Y. (2020). The effect of project based learning model combined with snake and ladder media to fifth graders' learning activity and outcomes in social studies. *Technium Social Sciences Journal*, *8*, 132–140. https://doi.org/10.47577/tssj.v8i1.702

Dilekçi, A., & Karatay, H. (2023). The effects of the 21st century skills curriculum on the development of students' creative thinking skills. *Thinking Skills and Creativity*, *47*. https://doi.org/10.1016/j.tsc.2023.100762

Forbes, C., & Davis, E. (2010). Curriculum design for inquiry: Preservice elementary teachers' mobilization and adaptation of science curriculum materials. *Journal of Research in Science Teaching*, *47*(7), 820–839. https://doi.org/10.1002/tea.20379

Hairunisa, Hakim, A. R., & Nurjumiati. (2019). Studi pengaruh model pembelajaran berbasis proyek (project based learning) terhadap kreativitas mahasiswa program studi PGSD pada mata kuliah konsep dasar IPA. *Jurnal Pendidikan MIPA*, *9*(2), 93–96.

Handoko, H. (2017). Pembentukan keterampilan berpikir kreatif pada pembelajaran matematika model SAVI berbasis discovery strategy materi dimensi tiga kelas X. *EduMa*, *6*(1), 85–95.

Harefa, D. (2023). Efektivitas model pembelajaran talking chips untuk meningkatkan hasil belajar siswa. *Tunas: Jurnal Pendidikan Biologi*, *4*(1), 83–99.

Harianja, M. M., & Sapri, S. (2022). Implementasi dan manfaat ice breaking untuk meningkatkan minat belajar siswa sekolah dasar. *Jurnal Basicedu*, *6*(1).

Haryanti, Y. D., & Saputra, D. S. (2019). Instrumen penilaian berpikir kreatif pada pendidikan abad 21. *Jurnal Cakrawala Pendas*, *5*(2), 58–64.

Hasanah, M., Supeno, S., & Wahyuni, D. (2023). Pengembangan e-modul berbasis flip pdf professional untuk meningkatkan keterampilan berpikir kreatif siswa pada pembelajaran IPA. *Tarbiyah Wa Ta'lim: Jurnal Penelitian Pendidikan Dan Pembelajaran*, *10*(1), 44–58.

Huang, N. T., Chang, Y. S., & Chou, C. H. (2020). Effects of creative thinking, psychomotor skills, and creative self-efficacy on engineering design creativity. *Thinking Skills and Creativity*, *37*. https://doi.org/10.1016/j.tsc.2020.100682

Kurniawan, W., & Budiono, A. (2018). Implementation of project based learning model to increase students' competence in machining work. *APTEKINDO*. https://doi.org/10.2991/aptekindo-18.2018.17

Kusadi, N. M. R., Sriartha, I. P., & Kertih, I. W. (2020). Model pembelajaran project based learning terhadap keterampilan sosial dan berpikir kreatif. *TSCJ*, *3*(1), 18–27.

Lestari, I., & Ilhami, A. (2022). Penerapan model project based learning untuk meningkatkan keterampilan berpikir kreatif siswa SMP: Systematic review. *Jurnal Basicedu*, *12*(2), 135–144.

Mirdad, J. (2020). Model-model pembelajaran (empat rumpun model pembelajaran). *Jurnal Sakinah*, *2*(1), 14–23.

Nengsih, Y. K., Nurrizalia, M., Waty, E. R. K., & Shomedran, S. P. (2022). Buku ajar media dan sumber belajar pendidikan luar sekolah. Bening Media Publishing.

Noviyana, H. (2017). Pengaruh model project based learning terhadap kemampuan berpikir kreatif matematika siswa. *Jurnal Edumath*, *3*(2), 110–117.

Nugrahaningrum, O. (2023). Virtual reality-based game learning on animal reproduction for elementary school level. *Profesi Pendidikan Dasar*, 129–142. https://doi.org/10.23917/ppd.v10i2.4926

Nurhadiyati, A., Rusdinal, R., & Fitria, Y. (2021). Pengaruh model project based learning (PjBL) terhadap hasil belajar siswa di sekolah dasar. *Jurnal Basicedu*, *5*(1), 327–333.

Pan, A. J., Lai, C. F., & Kuo, H. C. (2023). Investigating the impact of a possibility-thinking integrated project-based learning history course on high school students' creativity, learning motivation, and history knowledge. *Thinking Skills and Creativity*, *47*. https://doi.org/10.1016/j.tsc.2023.100753

Permendikbud. (2014). Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 57 Tahun 2014 Tentang Kurikulum 2013 Sekolah Dasar/Madrasah Ibtidaiyah.

Pratiwi, E. T., & Setyaningtyas, E. W. (2020). Jurnal basicedu. *JURNAL BASICEDU*, *4*(2), 379–388.

Primadoni, A. B., & Muslim, R. I. (2023). Faktor rendahnya keterampilan berpikir kreatif dalam menciptakan inovasi baru. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *8*(3), 958–966.

Rafik, M., Nurhasanah, A., Febrianti, V. P., & Muhajir, S. N. (2022). Telaah literatur: Pengaruh model pembelajaran project based learning (PjBL) terhadap kreativitas siswa guna mendukung pembelajaran abad 21. *Jurnal Pembelajaran Inovatif*, *05*(01), 80–85.

Rahmawati, F., & Atmojo, I. R. W. (2021). Analisis media digital video pembelajaran abad 21 menggunakan aplikasi canva pada pembelajaran IPA. *Jurnal Basicedu*, *5*(6).

Rani, H. (2021). Penerapan metode project based learning pada pembelajaran sejarah kebudayaan Islam dalam meningkatkan motivasi belajar. *Jurnal Pendidikan Refleksi*, *10*(2), 1–8.

Rufaida, S., & Mubarokah, I. (2023). Upaya peningkatan keterampilan berpikir kreatif melalui model experiential learning peserta didik SMP UNISMUH Makassar. *Karst: Jurnal Pendidikan Fisika Dan Terapannya*, *2*(2), 46–55.

Rusnawati, M., Santyasa, I., & Tegeh, I. (2021). The effect of project based e-learning models toward learning outcomes and critical thinking skills of vocational high school students. *JPP (Jurnal Pendidikan Dan Pembelajaran)*, *27*(2), 57–64. https://doi.org/10.17977/um047v27i22020p057

Sari, R. T., & Angreni, S. (2018). Penerapan model pembelajaran project based learning (PjBL) upaya peningkatan kreativitas mahasiswa. *Varia Pendidikan*, *30*(1), 79–83.

Sari, S. P., Manzilatusifa, U., & Handoko, S. (2019). Penerapan model project based learning (PjBL) untuk meningkatkan kemampuan berfikir kreatif peserta didik. *JP2EA: Jurnal Pendidikan Dan Pembelajaran Ekonomi Akutansi*, *5*(2), 119–131.

Sogen, Y. (2023). Development of cultural arts learning in project based learning for students of elementary school department, faculty of education and teacher training, Nusa Cendana University, Kupang- Indonesia. *Harmonia*, *1*(1), 43–54. https://doi.org/10.61978/harmonia.v1i1.88

Sugiyono. (2017). *Metode penelitian kuantitatif, kualitatif dan R&D.* Bandung: PT Alfabet.

Sukmana, I. K., & Amalia, N. (2021). Pengaruh model pembelajaran project based learning terhadap peningkatan motivasi belajar dan kerja sama siswa dan orang tua di era pandemi. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(5), 3163–3172. https://doi.org/10.31004/edukatif.v3i5.1068

Tsybulsky, D., & Muchnik-Rozanov, Y. (2023). The contribution of a project-based learning course, designed as a pedagogy of practice, to the development of preservice teachers' professional identity. *Teaching and Teacher Education*, *124*. https://doi.org/10.1016/j.tate.2023.103925

Tulungagung, T. (2023). A systematic literature review: The impact of project-based learning model implementation on high school students' learning outcomes assessed through VOSviewer in the Google Scholar database. *Jurnal Pelita Pendidikan*, *11*(1). https://doi.org/10.24114/jpp.v11i1.40656

Usmeldi, U., & Amini, R. (2022). Creative project-based learning model to increase creativity of vocational high school students. *International Journal of Evaluation and Research in Education (IJERE)*, *11*(4), 2155. https://doi.org/10.11591/ijere.v11i4.21214

Vahlepi, S., Helty, & Tersta, F. W. (2021). Implementasi model pembelajaran berbasis case method dan project based learning dalam rangka mengakomodir higher order thinking skill mahasiswa dalam mata kuliah psikologi pendidikan bahasa Arab di masa pandemi. *Jurnal Pendidikan Tabusai*, *5*(3), 10153–10159.

Wahyuni, L., & Rahayu, Y. S. (2021). Pengembangan e-book berbasis project based learning (PjBL) untuk melatihkan kemampuan berpikir kreatif pada materi pertumbuhan dan perkembangan tumbuhan kelas XII SMA. *Bioedu: Berkala Ilmiah Pendidikan Biologi*, *10*(2), 314–325.

Zakiah, N. E., Fatimah, A. T., & Sunaryo, Y. (2020). Implementasi project-based learning untuk mengeksplorasi kreativitas dan kemampuan berpikir kreatif matematis mahasiswa. *Teorema: Teori Dan Riset Matematika*, *5*(2), 285–293.

Zativalen, O., Irmaningrum, R. N., & Husna, A. (2022). Pengaruh model pembelajaran berbasis proyek (project based learning) terhadap kreativitas mahasiswa program studi PGSD pada mata kuliah sumber dan media pembelajaran. *Elementa: Jurnal PGSD STKIP PGRI Banjarmasin*, *4*(2), 4450.

Zoch, M., Langston-DeMott, B., & Adams-Budde, M. (2014). Creating digital authors. *Phi Delta Kappan*, *96*(3), 32–37. https://doi.org/10.1177/0031721714557450

Zouganeli, E., Tyssø, V., Feng, B., Arnesen, K., & Kapetanovic, N. (2014). Project-based learning in programming classes–the effect of open project scope on student motivation and learning outcome. *IFAC Proceedings Volumes*, *47*(3), 12232–12236.

Zulyusri, Z., Elfira, I., Lufri, L., & Santosa, T. A. (2023). Literature study: Utilization of the PjBL model in science education to improve creativity and critical thinking skills. *Jurnal Penelitian Pendidikan IPA*, *9*(1), 133–143.

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