ISSN 2987-4270
PLE
Physics Learning and Education
Vol. 4 No. 2 (2026)

Needs Analysis for the Development of an Inquiry-Based Learning E-Module Integrated with Deep Learning to Facilitate Students' Creative Thinking Skills on Heat Concepts

Syalsahadi[1], Emiliannur[1*], Fatni Mufit[1], Hayyu Yumna[1].

[1] *Department of Physics, Universitas Negeri Padang, Jl. Prof. Dr. Hamka Air Tawar Padang 25131, Indonesia*
Corresponding author. Email: *emiliannur@fmipa.unp.ac.id*

ABSTRACT

Efforts to develop 21st-century skills are focused on a student-centered learning approach, where educators act as facilitators in supporting the learning process. One of the main focuses in this skill is the development of four core competencies known as the 4Cs: creative thinking, critical thinking, communication, and collaboration skills. One of the four most important skills that students must develop is creative thinking. However, in reality, mastery of this skill remains relatively low. This low ability is caused by teaching materials used in the learning process that have not been fully designed to support students' creative thinking skills and the inquiry-based learning model. This study aims to analyze the needs of e-modules based on an inquiry-based learning model integrated with deep learning. This study used a development research approach with the 4-D model (Define, Design, Development, and Disseminate), which was limited to the Development stage. The results revealed three main findings from the needs analysis: (1) the creative thinking skills of 11th-grade students at SMAN 2 Padang are still classified as very low with an average score of 40%; (2) the teaching materials used are still limited to printed textbooks and are not yet able to optimally facilitate students' creative thinking skills; (3) The results of the analysis of student characteristics show that 92% of students have a positive view of the use of digital teaching materials. Support for these digital learning materials is also seen from the results of the questionnaire which shows that students find it easier to understand Physics material through videos or online simulations and require learning materials equipped with visual elements, multimedia, such as images, animations, and learning videos, with an average percentage of 92%. In addition, the potential for utilizing digital learning materials in the learning process is considered very large, considering that around 91% of students already have smartphones that can be used for digital-based learning. The research conclusion obtained from the needs analysis is that the development of E-Modules based on inquiry-based learning integrated with deep learning to facilitate students' creative thinking skills on heat material is very much needed by students.

Keywords: E-Modules, Inquiry Based Learning, Deep Learning, Creative Thinking.

I. INTRODUCTION

Education is a crucial aspect of a nation's progress. 21st-century education is undergoing significant changes resulting from rapid technological advances. In an era of globalization and rapid technological advancement, the need for 21st-century skills is increasing. Relevant 21st-century competencies are essential for students to prepare for future challenges. 21st-century skills focus on a student-centered learning approach, where educators act as facilitators in supporting the learning process. One of the main focuses of these skills is the development of four core competencies, known as the 4C: critical thinking and problem solving, creativity and innovation, collaboration, and effective communication [1]. One of the four most important skills for students to develop is creative thinking.

In learning Physics, students are not only required to have strong knowledge and understanding of concepts, but must also develop creative thinking skills. According to [2] Physics not only emphasizes mastery of concepts and formulas, but also requires students to study natural phenomena, find relationships between concepts, and formulate various solutions to a problem. Through this process, students are trained to think fluently in generating ideas, flexible in using various problem-solving strategies, original in putting forward new

ideas, and elaborative in developing ideas more deeply. Students' creative thinking skills can generate new ideas in solving Physics problems, both theoretically and practically, in innovative ways [3]. Creative thinking skills are very important in Physics learning activities because they can help students create new ideas, solve problems with their ideas, and be able to use the knowledge they have to solve Physics problems logically and innovatively [4].

Based on teaching experience during the educational field practice at SMAN 2 Padang, the teaching materials used at the school primarily consist of printed physics textbooks by Marthen Kanginan and published by Erlangga. These textbooks contain learning materials accompanied by essay and multiple-choice exercises. However, the textbooks do not provide questions specifically designed to develop students' creative thinking skills. Furthermore, the availability of printed textbooks in schools is still limited, so their use is limited to classroom learning activities. Furthermore, the learning process implemented by teachers remains focused on delivering material and discussing textbook exercises. This teacher-centered approach tends to create a one-way learning environment that can lead to student boredom, resulting in less diverse and less engaging learning activities.

One appropriate model to address students' low creative thinking skills in physics learning is the Inquiry-Based Learning model. This model emphasizes the process of building knowledge through scientific inquiry activities carried out independently by students. Through Inquiry-Based Learning, students are guided to observe phenomena, formulate questions, collect and analyze data, and draw conclusions based on scientific evidence. Research by [5] shows that the application of the Inquiry-Based Learning model can improve students' creative thinking skills in understanding physics concepts and connecting them to real-world phenomena. Inquiry-based learning is a process in which students actively build knowledge through asking questions, formulating hypotheses, conducting investigations, and drawing conclusions based on data [6].

To support the implementation of the Inquiry-Based Learning model, a deep learning approach can be applied to improve students' creative thinking skills. According to [7], deep learning emphasizes meaningful and enjoyable learning experiences where students do not simply receive information passively. Instead, they are actively engaged in understanding concepts, connecting knowledge to real-life experiences, and reflecting on their learning process. Furthermore, research by [8] shows that a deep learning approach provides opportunities for students to develop their imagination, generate new ideas, and explore various possible solutions to the problems they face. This approach directly supports the development of creative thinking as part of higher-order thinking skills.

Implementing a deep learning strategy requires an integrated instructional design that includes clear learning objectives, meaningful learning activities, and assessments that support conceptual understanding. In addition, this approach encourages collaboration, discussion, case studies, and project-based learning assignments. Through this learning strategy, students are expected to develop higher-order thinking skills that are highly relevant to the challenges of the 21st century. One solution that can be used to support the implementation of the Inquiry-Based Learning model and deep learning approach is the use of e-modules in the learning process. E-modules are designed to create a more meaningful and adaptive learning process and encourage active student engagement, in accordance with the characteristics of the Inquiry-Based Learning model integrated with deep learning, which emphasizes in-depth understanding of concepts. Research conducted by [9] stated that e-module-assisted learning has a positive influence on improving students' creative thinking skills.

This e-module design was created through the Heyzine platform as a digital learning support medium. Some of Heyzine's advantages include: 1) It makes it easy to create interactive and aesthetic digital-based teaching materials, thereby increasing students' motivation to learn independently; 2) This application is user-friendly and can be used even by novice teachers; 3) Heyzine is able to produce a professional and attractive digital book display for students; 4) Heyzine allows the e-module results to be integrated with various digital learning platforms; 5) As an online-based application, Heyzine can be used directly without an installation process [10]

Based on this explanation, teaching materials in the form of e-modules based on the Inquiry Based Learning model integrated with deep learning are a strategic step to facilitate students' creative thinking skills in high school/Islamic high school. Unlike previous studies, the e-modules developed in this study are based on the Inquiry Based Learning model, integrate a deep learning approach, and are equipped with multimedia, so that learning becomes more engaging and meaningful. The material studied focuses on the concept of heat, which has a close relationship with everyday life phenomena.

II. METHOD

The research method used in this study is Research and Development (R&D). The Research and Development (R&D) method was chosen in this study as a framework for producing new products and testing

their success. In this study, the Research and Development (R&D) approach was chosen. The research model used in this study is 4D. The 4-D development research model is a model that involves stages (Define, Design, Develop, Disseminate) proposed by [11]. This model was chosen based on the consideration that the 4-D research design is methodical and based on theoretical principles of educational product development, so that the resulting product meets feasibility standards. The 4-D model have special protocols that will help researchers in creating a product. This research was conducted at SMAN 2 Padang with a population consisting of physics teachers and all students of class XI phase F. The sampling technique used was 30 students in class XI f11, namely all members of the student population of phase F were used as research samples because the number was relatively limited and was considered representative to describe the conditions studied.

Data were collected through a creative thinking ability test instrument, a physics teacher interview instrument, and a student characteristics assessment instrument. The teacher interview sheet in this study aims to obtain the information needed to develop an electronic module based on an inquiry-based learning model integrated with in-depth learning. Furthermore, the creative thinking ability test in the form of an essay question sheet on the heat material was administered by [12]. The use of this instrument was based on the availability of validated questions, considering the lack of a creative thinking instrument specifically validated for the heat material. The instrument contains indicators of creative thinking ability, which aims to determine the extent to which students have mastered one of the important skills that must be developed in the 21st century. Similarly, the student characteristics assessment instrument, filled out directly by students, aims to identify problems that arise during classroom learning. Each instrument is compiled and adjusted periodically according to analytical needs to provide more contextual, interactive, and reality-based learning materials. Each instrument is systematically designed and tailored to the research analysis needs to ensure the data obtained is more accurate, valid, and relevant. Therefore, the instruments used are expected to produce comprehensive information to support the development of e-modules that are more contextual, interactive, and reality-based in learning.

This study employed qualitative data analysis through interviews and quantitative analysis using descriptive statistics to evaluate the results of the creative thinking ability test and questionnaire regarding student characteristics. To clarify the quantitative results, the data are presented in tables and group summaries. This descriptive analysis aims to provide a deeper understanding of the scores obtained. The analysis categories for determining student characteristics were determined based on the scores obtained by each respondent. Each indicator was assessed using the following formula.

$$P = \frac{\sum x}{\sum xi} \times 100\%$$

The percentage results are then used as a basis for grouping student achievement levels into predetermined categories, thus providing a clear picture of the overall condition and characteristics of students. To measure students' creative thinking abilities, this is done by calculating the scores obtained, according to [13], using the following formula.

$$NP = \frac{R}{SM} \times 100$$

Description:
NP = Percentage value sought or expected
R = Raw score obtained by the student
SM = Ideal maximum score from the test in question
100 = fixed number

The interpretation categories of the results of the analysis of creative thinking skills can be seen in Table 1 below.

Table 1. Criteria for Creative Thinking Skills

Intervals	Category
86-100	Very high
76-85	Tall
60-75	Enough
55-59	Low
≤54	Very low

(Source: Ref[13,2])

III. RESULTS AND DISCUSSION

Results

The first research result is an analysis of students' creative abilities. Data were obtained through essay test sheets given to 30 students in grade XI phase F. Based on the results of the creative thinking skills test, it was found that students' creative thinking skills were still classified as very low, with an average score of 40%. Details of the average scores for each indicator of students' creative thinking skills are presented in Table 2.

Table 2. Results of Students' Creative Thinking Skills

No	Indicator	Score (%)	Category
1	Flexibility	45	Very low
2	Originality	37	Very low
3	Elaboration	40	Very low
4	Fluency	38	Very low

Based on the data in Table 2, it is clear that students' creative thinking skills in physics learning are still relatively low and require serious attention. Students' creative thinking skills showed an average score of 40, which is categorized as very low. The data obtained indicate that students have not yet demonstrated optimal ability to generate new ideas, think originally, and develop alternative solutions in the context of solving real-life physics problems. Based on the results of the data analysis, the lowest average score was found in the originality indicator. According to [14], originality is the ability to think creatively to produce answers that are unique, unusual, and different from the answers typically given by most people. This aligns with research conducted by [15], which places the originality indicator at the highest position among other creative thinking indicators, as originality is a key characteristic in assessing a product of creative thinking, which must be different from previous ones.

The low level of students' creative thinking skills is caused by knowledge transfer patterns that do not consider students' creative thinking skills. The physics learning process in schools is often teacher-centered and dependent on textbooks. Conventional methods, such as lectures and Q&A sessions, tend to make students passive and less engaged in the learning process. Tests and questions given to students often focus only on low-level cognitive thinking, with an emphasis on memorization. This situation highlights the importance of developing teaching materials that not only convey material but also facilitate students' creative skills. These teaching materials, in the form of electronic modules, have great potential to improve learning effectiveness, particularly in facilitating students' creative thinking skills. However, this potential needs to be optimized by implementing appropriate learning models. Therefore, developing e-modules based on inquiry-based learning integrated with deep learning is a good strategy, especially for facilitating students' creative thinking skills.

The second research result was an interview with a physics teacher at SMAN 2 Padang. The teacher interview questionnaire covered three aspects: physics learning, the use of learning models, and the teacher's perspective on digital learning. A summary of the teacher's responses to several interview questions is presented in Table 3.

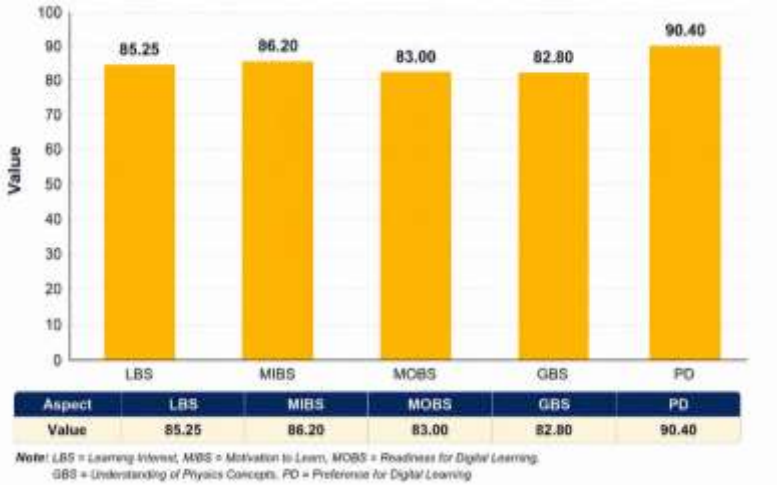
Table 3. Summary of Teacher Interview Results

No	Question Indicator	Teacher Response
Physics Learning		
1	What are your views and assessments regarding Physics learning?	Many students just memorize formulas for exam scores without really understanding the application of Physics in everyday life.
2	How is Physics learning implemented in schools?	Learning is still dominated by lectures due to demands for completing material and time constraints.
3	What are the problems and obstacles faced in implementing Physics learning?	Teachers are also burdened with excessive administration, so that the time to prepare creative learning is reduced.
4	What are the factors that cause problems and obstacles faced in implementing Physics	Teachers are also burdened with excessive administration so that the time to prepare creative

	learning?	learning is reduced and there are many activities at school.
Use of learning models		
1	What are your views and assessments regarding the learning model used in learning	learning is still dominated by lectures
2	In 21st-century learning, there are various innovative learning models. What learning models do you use in your learning?	I use Problem Based Learning but, to be honest, in practice these models are often simplified because the number of students is too large and the students' abilities are very diverse.
3	What are the steps you take in implementing the Deep Learning learning approach?	I tried to start by providing contextual problems, group discussions, and reflection on learning. However, I noticed that not all students were ready for the Deep Learning approach.
4	What problems and obstacles are faced during the use of this learning approach in Physics learning?	The students' basic and results are still lacking so implementing deep learning is rather difficult.
Teachers' views on digital learning		
1	How do you see the development of digital learning in recent years? Have there been any significant changes in the way you teach?	The development of digital learning is indeed very rapid, but in my opinion not all of it has a positive impact.
2	What is your experience using digital teaching materials in learning?	The use of digital teaching materials is quite helpful in attracting students' attention.
3	Of the various types of digital teaching materials available, which do you think is the most effective for classroom learning? Why?	In my opinion, interactive learning videos and virtual simulations are quite effective because they help visualize abstract concepts.
4	Of the various types of digital teaching materials available, which do you think is the most effective for classroom learning? Why?	I've used e-modules and the results have been quite varied. Diligent students find the material easy to access helpful.
5	In your opinion, what are the advantages of e-modules compared to printed modules?	E-modules are more practical, paper-saving, and easy to update. However, I believe excessive use of e-modules can also discourage in-depth reading habits, as students tend to skim without fully understanding the content.

Based on interviews with teachers, a significant gap is seen between the demands of 21st-century learning and physics learning practices, which are still dominated by conventional approaches. Learning that should develop critical thinking, creativity, collaboration, and communication skills has not been fully realized due to dense material and limited time allocation. In addition, in the implementation of learning models, teachers stated that although they have tried to apply Problem Based Learning (PBL), in practice the model is often simplified. This is due to the large number of students and the heterogeneity of student abilities. This condition causes the implementation of innovative learning models to not run optimally. From the digital learning perspective, teachers stated that technological developments have had a significant impact. E-modules are also considered helpful in terms of practicality, efficiency, and ease of access to materials. Therefore, it is necessary to develop contextual, flexible, and integrated digital technology-based teaching materials for more systematic and effective learning. Thus, inquiry-based learning integrated with deep learning and digital technology is expected to improve the quality of conceptual understanding, activeness, and student learning independence in physics learning.

The third research result relates to the problem of determining student characteristics in physics learning. Information was collected by sending out questionnaires to 30 learners of grade XI phase F. The analysis results show student characteristics in physics learning. There are five stages in questionnaire analysis: learners background (LBS), student learning interest (MIBS), student learning motivation (MOBS), student learning style (GBS), and digital learning (PD). The results of determining student characteristics can be seen in Figure.



Aspect	LBS	MIBS	MOBS	GBS	PD
Value	85.25	86.20	83.00	82.80	90.40

Note: LBS = Learning Interest, MIBS = Motivation to Learn, MOBS = Readiness for Digital Learning, GBS = Understanding of Physics Concepts, PD = Preference for Digital Learning

Fig. 1. Results of Analysis of Students' Characteristics in Physics Learning

The data in Figure 1 shows that each aspect of student characteristics has a relatively high level of support for the implementation of digital-based learning. The student background aspect received an average score of 85.25, which is in the high category. This result indicates that students' initial conditions, both in terms of learning experience and access to technology, are quite supportive of digital learning. For the learning interest aspect, the average score was 86.2, which is in the high category. This indicates that students have a strong interest in the learning process and are beginning to demonstrate active involvement in learning activities. Furthermore, the learning motivation aspect received an average score of 83, which is also in the high category. However, these results indicate that student learning motivation still needs to be improved to support more active, independent, and consistent learning participation. The student learning style aspect received an average score of 82.8, which is in the high category. This finding indicates that most students have appropriate learning style tendencies to support modern learning processes, including technology-based learning. However, optimization of learning strategies is still needed to facilitate students' different learning styles more effectively. Meanwhile, the digital learning aspect achieved the highest average score, at 90.4, categorized as very high. This result indicates that students have a very positive response and acceptance of the use of technology in learning. Although the implementation of digital learning in schools is not yet fully optimal, students have demonstrated high readiness and enthusiasm for the use of digital learning media.

Overall, the results of the student characteristics analysis indicate that students have good potential to support the implementation of digital-based and innovative learning. High scores in the aspects of learning interest, learning motivation, learning styles, and digital learning indicate that the development of e-modules based on Inquiry-Based Learning integrated with deep learning has great potential for effective implementation in the physics learning process..

Discussion

Based on the findings of this study, three main issues were identified: low levels of students' creative thinking skills, the dominance of conventional learning practices in physics teaching, and the great potential for implementing digital-based learning through e-modules integrated with Inquiry-Based Learning and immersive learning approaches. These findings demonstrate the importance of developing innovative learning strategies that can facilitate students' higher-order thinking skills, particularly creative thinking.

The results of the study indicate that students' creative thinking skills are still categorized as very low, with an average score of 40%. The indicators of flexibility, originality, elaboration, and fluency proposed by [16] all showed unsatisfactory achievement. This condition indicates that students still experience difficulties in generating diverse ideas, proposing original solutions, and developing ideas in depth when solving physics problems. One factor contributing to this condition is the learning process, which is still dominated by a teacher-centered approach that emphasizes memorization and procedural problem solving. Such learning conditions limit students' opportunities to actively construct knowledge and explore ideas independently.

Inquiry-Based Learning is considered suitable for addressing this issue because it emphasizes active student involvement in the learning process through scientific inquiry activities. Through Inquiry-Based Learning, students are encouraged to observe phenomena, formulate questions, propose hypotheses, conduct investigations, analyze data, and draw conclusions independently [17]. This learning process can support the development of creative thinking skills because students are given the opportunity to explore various ideas and alternative

solutions during problem-solving. Inquiry activities also train students to think more flexibly, fluently, and originally in understanding concepts and connecting them to real-life situations. Therefore, Inquiry-Based Learning creates a more meaningful and exploratory learning environment that can stimulate students' creativity and intellectual independence.

Interviews with teachers revealed that physics instruction has not been optimally implemented to facilitate the development of creative thinking skills. Learning activities are still dominated by lectures due to limited teaching time, dense learning materials, large class sizes, and teachers' administrative responsibilities. This often results in only partial implementation of innovative learning models. As a result, students have fewer opportunities to explore concepts in depth and actively participate during the learning process.

The integration of deep learning into Inquiry-Based Learning significantly improves the quality of learning. Deep learning emphasizes meaningful understanding, active participation, reflection, and the connection between concepts and real-life experiences [18]. Through this approach, students are encouraged not only to understand concepts theoretically but also to apply knowledge critically and creatively in a variety of situations. Contextual problems, collaborative discussions, reflective activities, and interactive digital learning resources support students in constructing knowledge independently and meaningfully [19]. As a result, the learning process becomes more student-centered and facilitates the development of higher-order thinking skills, including creative thinking.

Compared to previous research, this study provides a more comprehensive approach by integrating Inquiry-Based Learning, immersive learning, and e-modules into a single learning design. Previous research generally examined these components separately. Research conducted by [7,2] emphasized the importance of meaningful learning experiences through immersive learning, while research by [9,2] on the role of e-modules in enhancing creative thinking skills. In contrast, this study combines all three components simultaneously to create a learning environment that encourages active inquiry, meaningful conceptual understanding, and flexible digital learning experiences. This integrated approach is considered more relevant to the demands of 21st-century education because it supports not only conceptual mastery but also creativity, independence, and active student engagement.

Furthermore, an analysis of student characteristics indicates a strong readiness to support the implementation of digital-based learning. High scores in learning interest, learning motivation, learning styles, and digital learning aspects indicate that students are receptive to technology-based learning environments. This condition is a crucial supporting factor for the implementation of e-modules integrated with Inquiry-Based Learning and immersive learning approaches.

Electronic modules also offer several advantages compared to conventional teaching materials because they can present learning materials through multimedia elements such as text, images, animations, videos, and interactive simulations. These features enable students to learn more independently, flexibly, and at their own pace and learning style. Furthermore, the use of electronic modules can make abstract physics concepts easier to understand and create a more engaging learning experience. Therefore, the development of electronic modules based on Inquiry-Based Learning (IBL) integrated with immersive learning is considered a relevant and strategic solution to improve the quality of physics learning and facilitate students' creative thinking skills.

IV. CONCLUSION

Based on the research results, students' creative thinking skills in physics learning are still categorized as very low, while the learning process is still dominated by conventional methods that do not optimally support the development of higher-order thinking skills. However, students showed high interest, motivation, and readiness for digital-based learning, which indicates that the development of an e-module based on Inquiry-Based Learning integrated with in-depth learning is a relevant solution to support more meaningful, interactive, and student-centered learning while facilitating creative thinking skills. This research is limited to the needs analysis stage and has not tested the validity, practicality, or effectiveness of the developed e-module; therefore, further research is recommended to continue product development and test its effectiveness in improving students' creative thinking skills. The findings of this study also imply that physics teachers need to integrate inquiry activities, meaningful learning experiences, and digital learning materials to create more active and creative physics learning.

ACKNOWLEDGMENT

The researcher would like to thank Mr. Nuragusman Eka Putra as the principal of SMA Negeri 2 Padang, who has allowed this research to be conducted in the school he leads. The author would also like to thank Mrs. Herry Yenti Siska and the students of class XIF11 who were willing to be respondents in this study so that the

researcher obtained initial data as a reference in developing an E-Module based on an inquiry-based learning model integrated with deep learning to facilitate students' creative thinking skills. Finally, the author would like to thank all parties who have motivated the researcher in compiling this article.

REFERENCES

[1] Asri, I. H., Lasmawan, I. W., & Suharta, I. G. P., "Kompetensi Abad 21 Sebagai Bekal Menghadapi Tantangan Masa Depan," *Kappa Journal.*,vol. 7, no. 1, pp. 97–107, 2023.

[2] Wafa, A. S., Abdurrahmat, A. S., Nana, N., Hernawati, D., & Badriah, L., "Profil Keterampilan Berpikir Kreatif Peserta Ddidk Pada Pembelajaran Fisika," *Jurnal Inovasi Pendidikan Berbantuan Teknologi*., vol. 5, no. 1, pp. 46–53, 2025.

[3] W. Sumarni, N. Wijayati, and S. Supanti., "Kemampuan Kognitif Dan Berpikir Kreatif Siswa Melalui Pembelajaran Berbasis Proyek Berpendekatan STEM,"*Jurnal Pembelajaran Kimia.*, vol. 4, no. 1, pp. 18–30, 2019.

[4] Mu'minah, I. H., "Studi Literatur: Pembelajaran Abad-21 Melalui Pendekatan STEM (Science, Technology, Engineering, Art, and Mathematics) dalam Menyongsong Era Society 5.0, " *Seminar Nasional Pendidikan*, 584–594, 2021

[5] Fadila, F. N., Husna, R. L., & Rabiudin., "Penerapan inquiry-based learning dalam pembelajaran IPA untuk meningkatkan kemampuan berpikir kreatif dan inovatif peserta didik, " *CJPE: Cokroaminoto Journal of Primary Education*., vol. 8 no. 2, pp. 1069–1079, 2025.

[6] Pedaste, Margus, Mario Mäeots, Leo A. Siiman, Ton De Jong, Zacharias C. Zacharia, and Eleftheria Tsourlidaki., "Phases of Inquiry-Based Learning : Definitions and the Inquiry Cycle." *Educational Research Review Journal.*, vol. 14, no. 1, pp, 47–61, 2015.

[7] Fatmawaty, "Deep Learning : Sebuah Pendekatan untuk Pembelajaran Bermakna," *J. Ilmu Pendidik.*, vol. 1, no. 1, pp. 71–85, 2024.

[8] Akmal, A. N., Maelasari, N., Ilmu, T., & Islam, P., Pemahaman Deep Learning dalam Pendidikan : Analisis Literatur melalui Metode Systematic Literature Review (SLR). *Jurnal Ilmiah Ilmu Pendidikan*, vol. 8, no. 3, pp. 3229–3236, 2025.

[9] Nurita, T., Nuril, A., Fauziah, M., Mahdiannur, M. A., Susilowati, R., & Hendratmoko, A. F., "Fostering Creative Thinking Skills in Creating Domain of Anderson ' s Taxonomy for Prospective Science Teachers Using E-Modul". *TEM Jurnal*, vol. 14 no. 3, pp. 2339–2348, 2025.

[10] H. Haniah, M. Mahira, and M. N. Djuaeni, "The Development of Interactive E-Book-Based Teaching Materials for Senior High School Students," *Arab. J. Bhs. Arab*, vol. 7, no. 1 May, p. 55, 2023, doi: 10.29240/jba.v7i1.6690.

[11] Afifah, & Asrizal., Needs Analysis to Develop Heat ICT Based Teaching Material with ETHNO-PBL to Promote Students ' C ritical and Creative Thinking Skills. *Physics Learning and Education*. vol. 3, no. 2, pp. 89–98, 2025.

[12] S. Thiagarajan, D. S. Semmel, and M. I. Semmel, *Instructional Development for Training Teachers of Exceptional Children: A Sourcebook*. Bloomington: Indiana Univ, 1974.

[13] M. N. Purwanto, *Prinsip-Prinsip dan Teknik Evaluasi Pengajaran*. Bandung: Bandung: Remaja Rosdakarya, 2013.

[14] Nurdayanti, S., & Putri, A. N., Analisis Aspek Originality Pada Keterampilan Berpikir Kreatif Siswa Materi Perubahan Lingkungan. *Jurnal Ilmu Pendidikan*, vol. 6, no. 1, pp. 33–37, 2020.

[15] Yuli, T., & Siswono, E., Proses Berpikir Kreatif Siswa Dalam Memecahkan Dan Mengajukan Masalah Matematika. *Jurnal Ilmu Pendidikan*, vol. 15, no. 1, pp. 60–68, 2008.

[16] U. Munandar, *Pengembangan kreativitas anak berbakat*. PT Rineka Cipta, 2022.

[17] Kurniati, Fitri, and Sifak Indana., "Membangun Keterampilan Berpikir Kreatif Siswa Melalui Pembelajaran Berbasis Inkuiri Terbimbing." *Jurnal Penelitian Pendidikan IPA*. vol. 3, no. 1, pp. 15–20, 2018

[18] Situmorang, Erinawaty, Yahfenel Evi Fussalam, and Jaeni., "Implementasi Model Deep Learning (6CS) Untuk Meningkatkan Kreatifitas Musik Digital Siswa SMP." *Jurnal Pendidikan Dan Keguruan*. vol. 3, no. 10, 1553–1564, 2025.

[19] Nurhasanah, Pujiati., "Penerapan Pendekatan Deep Learning Pada Pembelajaran Di Sekolah Dasar Kota Bekasi." *Jurnal Pendidikan dan Pengajaran*, vol. 8, no. 1, pp. 72–79, 2025.