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Learning Approach for Enhancing Students' Creativity

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Abstract: Creativity is an ability that students must have to face the challenges of the 21st century. In education, creativity is needed to help students understand abstract concepts, solve problems and create innovative ideas. This article aims to identify various effective learning approach strategies to stimulate students' creativity and create an inspiring and productive learning atmosphere. The Search, Appraisal, Synthesis and Analysis (SALSA) approach is used. The results show that several methods, such as mind mapping, Project-Based Learning (PjBL), critical thinking, and guided inquiry, positively impact student creativity. PjBL was considered the most effective of all the methods studied due to its holistic and contextual approach, providing meaningful and in-depth learning experiences. This study recommends the implementation of PjBL, supported by other strategies such as mind mapping, to create innovative learning relevant to students' needs.

Keywords: creativity; project-based learning; mind mapping; inquiry; critical thinking.

INTRODUCTION

Creativity is an individual's ability to use imagination and possibilities gained from interaction with ideas, other people and the environment to make new and meaningful connections and results. Once a person is faced with a game or problem that requires creative thinking to solve, the person cannot solve it because it only dwells on one way out, and then there is someone who can help him through a way that he did not think of (Bara, 2012). Education today emphasises the importance of creativity as one of the 21st-century skills. Students are not only required to master knowledge but also to think critically and creatively. Many conventional learning models focus more on

direct teaching and memorisation, limiting the space for students to explore new ideas and think creatively. In the context of chemistry education, these barriers become more complex. Abstract chemistry concepts make students less motivated and can affect students' cognitive achievement. Chemistry is a science that seeks answers to the what, why, and how of natural phenomena related to composition, structure and properties, changes, and dynamics (Simatupang, 2021). Previous studies have shown that the lecture method still dominates classroom learning and can accommodate students' needs to think creatively and actively. As a result, many students find it challenging to understand the material, especially when learning is not connected to real-life contexts.

To overcome these problems, various innovative learning strategies have been developed. One of the most discussed methods is Project-Based Learning (PjBL), which has been proven effective in increasing student engagement and creativity. In addition, technologies such as augmented reality (AR) are also being integrated into learning to help students understand abstract concepts more visually and interactively. A diverse learning approach strategy can be an effective tool to enhance creativity. Through innovative and interactive methods, students are encouraged to think outside the box, explore new ideas and collaborate with their peers. Therefore, this article aims to identify various effective learning strategies to stimulate students' creativity and create an inspiring and productive learning atmosphere based on literature analysis from several related journals. By understanding and applying the right approaches, it is hoped that we can equip the younger generation with creative thinking skills that will be useful in their future lives.

METHOD

This research uses a systematic research method with the Search, Appraisal, Synthesis and Analysis (SALSA) approach (Grant & Booth, 2009). The research stages were carried out as follows:

Search

The literature search process was conducted through various academic databases, such as SINTA, Scopus, and Garuda, using keywords such as "creativity learning strategy" and "inquiry creativity development strategy". The search focused on Indonesian and English journal articles published between 2015-2024.

Appraisal

This process was conducted by applying inclusion and exclusion criteria. Selected articles focused on learning strategies, had clear research methods, addressed creativity development, and were published in accredited journals. Conversely, articles without full-text access, publications outside the timeframe, non-research articles, and sources with low methodological quality were excluded from the review.

Synthesis

This process includes mapping the main themes of learning strategies, identifying the characteristics of each approach, comparative analysis of creativity development strategies, and classification of methods based on creativity indicators.

Analysis

The analysis stage is the final stage, which includes narrative analysis of strategy comparison, critical interpretation of the effectiveness of each approach, identification of strengths and limitations, and synthesis of strategy development recommendations. Conclusions were drawn based on the available empirical evidence. The entire research process upholds the ethical principles of scientific publication by applying accurate citations, avoiding plagiarism, making objective interpretations, and respecting the work of previous researchers.

RESULTS AND DISCUSSION

Through a literature search, several learning models, including Project Based Learning (PjBL), Augmented Reality (AR), Problem-Based Learning (PBL), STEM-PjBL, Mind Mapping, and Cooperative Learning, increased student creativity. A summary of the articles is described in Table 1 below:

Table 1. Learning method analysis result

Author	Findings
(Fatmawati, F., et al. 2022)	The research method used in this study is Classroom Action Research (PTK), which aims to improve student learning creativity through the application of the Project Based Learning (PjBL) learning model. The results showed an increase of 14% from cycle I to cycle II, indicating that the application of the Project Learning (PjBL) learning model succeeded in increasing student learning creativity in class V SD Negeri 34/I Teratai.
(Setiawaty, S., et al. 2024)	The learning method is inquiry-based, where students go through several stages, such as observation, proposing problems, formulating hypotheses, and collecting and analysing data. Then, the Technology Acceptance Model (TAM) was used to evaluate students' acceptance of AR media. The results obtained by the average N-Gain of science process skills in the experimental class reached 0.57, higher than the control class, which only reached 0.40. The post-test score showed higher results in the experimental class (6.58) than in the control class (5.37), indicating that AR media effectively improves students' understanding of science skills.
(Rohani, A. 2023)	The research method used is standardised measurement through tests and questionnaires on students. Three tests were used: the critical thinking questionnaire, learning style inventory, and creativity test. The results showed that critical thinking has a significant positive relationship with creativity, where students who are better at critical thinking tend to be more creative.
(Purwati, P., et al. 2018)	The study used a quasi-experimental method conducted at the National Health Analyst Academy Surakarta using two regular classes B level 2. The average score for guided inquiry learning was higher than modified free inquiry. For students with high creativity, the average score for guided inquiry learning is 88, while in modified free inquiry, it is 82.
(Hidayah, N., et al. 2015)	The research method used was Classroom Action Research (PTK), which observed and analysed changes in learning activities, verbal creativity, and student learning outcomes in class X MIA C SMA Negeri 1 Kebumen in the 2013/2014 academic year. This study showed that guided inquiry learning assisted by LKS can increase student activity during the learning process. Student creativity in the high creativity category increased by 15% (from 48% to 63%).
(Lou, S. J., et al. 2017)	The research method used was a quasi-experimental design. The teaching experiment was conducted for six weeks, focusing on using project-based learning (PBL) integrated into STEM (science, technology, engineering and math) activities. The study's results were increased student creativity. Students showed a deeper understanding and application of STEM knowledge).
(Zakarya, et al. 2024)	The research method used was a qualitative approach with data collection techniques through observation, in-depth interviews, and document analysis. The results show that mind mapping enhances students' creativity through concept visualisation, problem-solving, and critical thinking skills development. Students who used mind mapping proved that it helps them organise ideas non-linearly and build associations between ideas that enrich their creativity.
(Aziz, R. et al. 2023)	This study involved quantitative and qualitative mixed methods, with a sequential explanatory approach conducted in two stages to examine the effect of classroom climate on student creativity. Regression analysis revealed that classroom activities influence students' creativity with R=0.532R=0.532R=0.532 and R2=0.283R^2=0.283R2=0.283 ($p<0.001$). This means that about 28.3% of the variation in students' creativity can be explained by classroom activities.
(MAN 3 Central Jakarta. 2023)	The research method used was an experiment with the Cooperative Learning model through a guided inquiry approach. The results showed that applying the Cooperative Learning model with a guided inquiry approach and applying the chemistry experiment method significantly improved students' interest, creativity, and understanding in learning redox reactions. The data obtained indicated that about 90.6% of students showed interest and felt helped by this method, with student creativity scores reaching an average of 95 for the resulting video project.

Various learning strategies can be applied to improve student creativity. One is the mind mapping method, where students are given space to think creatively and explore new ideas in a structured way that makes it easier to understand learning concepts. This mind mapping method has proven that students can better organise ideas non-linearly and build associations between ideas that enrich their creativity (Zakarya, Hafidz, Martaputu, 2022). This method focuses on understanding concepts and stimulates students' overall creative power. Designing mind maps allows students to utilise colours, images, and keywords to link ideas in unlimited ways.

The following method is project-based learning; students in one class are grouped to work on a project. Students must build their content knowledge and demonstrate new understandings through various forms of representation. Project-based learning can develop creativity by developing initiatives to produce new skills through research activities to work on and complete a learning project.

The application of the following learning method is inquiry-based with the media, augmented reality (AR), which effectively improves students' science process skills. The inquiry stages, such as observation, problem formulation, and data analysis, are combined with evaluating technology acceptance using the Technology Acceptance Model (TAM). The results showed that the average N-Gain of science process skills in the experimental class (0.57) was higher than that of the control class (0.40). In addition, the post-test score of the experimental class (6.58) was also higher than that of the control class (5.37), confirming that the use of AR was able to improve students' understanding of science skills significantly (Setiawaty et al., 2024).

The following method is critical thinking, which has a significant positive relationship with creativity. Students who are better at critical thinking tend to be more creative (Rohani, 2023). Critical thinking emphasises the importance of developing skills and providing opportunities for students to explore diverse learning styles to enhance their creativity and support more optimal learning outcomes.

Furthermore, the guided inquiry method and modified free inquiry method show that there is a significant influence between the use of guided inquiry methods and modified free inquiry methods on student creativity. Both contribute to improved learning outcomes. Based on the results of the Mann-Whitney test, it was found that learning with guided inquiry methods and modified free inquiry affected cognitive and affective learning outcomes but did not affect psychomotor learning outcomes. Quantitatively, cognitive learning outcomes show differences between the two methods. The average cognitive score for the guided inquiry class was 87.31 (Purwati et al., 2018), while the modified free inquiry class was 82.35, with a score distribution that tends to be better in the guided inquiry class at a high score interval (93-100) (Aziz et al., 2025).

Next is the guided inquiry learning model with LKS, which has been proven to increase student activities, creativity, and learning outcomes in the classroom. The quality and success of learning can be seen from students' activeness, creativity, and learning outcomes. Based on observations, questionnaires, and interviews in previous research, the inquiry learning model can increase student activity and creativity, improving

learning outcomes, including knowledge, attitudes, and skills (Hidayah et al., 2015). This model is believed to be effective in overcoming the problem of chemistry learning in classrooms with low creativity, according to Barrow's research, (2010) (Barrow, 2010), which shows that the inquiry steps can inspire students to be more creative.

Then, the final research method is an experiment with a model of Cooperative Learning. This model significantly shows increased students' interest, creativity, and understanding in learning redox reactions. The data obtained indicated that around 90.6% of students showed interest and felt helped by this method, with students' creativity scores reaching an average of 95 for the resulting video project (MAN 3 Jakarta Pusat, 2023).

These learning methods can complement each other to create creative and productive learning. Just as mind mapping can help students design projects in PjBL or as a reflection tool in guided inquiry, critical thinking methods can be integrated into all methods to encourage students to explore different learning styles. However, of the above methods, the Project-Based Learning method has the most significant impact on increasing student creativity because this method provides an approach that combines the development of creativity with 21st-century skills such as collaboration, problem-solving, and critical thinking.

This PjBL method allows students to actively learn through authentic projects relevant to their lives actively, thereby increasing engagement and understanding of concepts. Additionally, PjBL encourages students to integrate theory with practice, allowing them to explore creative ideas while applying the knowledge they have learned. With a wide range of research supporting its effectiveness, PjBL enhances student creativity, creates more meaningful learning experiences, and broadly impacts learning outcomes.

Student creativity can increase from 63% to 81.8% through PjBL (Fatmawati et al, 2022). In addition, the STEM-PjBL model also significantly impacts students' understanding of concepts and critical thinking skills, as evidenced by the results of statistical tests. The average score on the "imagination" aspect increased from 26.68 to 28.28, and the "curiosity" score from 28.70 to 30.45 in the STEM-PjBL model (Lou et al., 2017).

This shows that PjBL can provide consistent results in various aspects of learning, including creativity. However, the challenges in PjBL are the need for more time, good group coordination, and a very strategic role of teachers as facilitators. Therefore, to maximise the impact of PjBL, teachers need to provide clear guidance, use tools such as mind mapping for planning, and integrate technologies such as augmented reality (AR) to help visualise complex concepts.

CONCLUSIONS

The most effective learning strategy to enhance students' creativity is Project- Based Learning (PjBL). Although various methods such as mind mapping, critical thinking, and guided inquiry also contribute positively to stimulating creativity, PjBL provides the most significant impact. This method combines creativity development with 21st-

century skills, such as collaboration, problem-solving, and critical thinking, allowing students to learn through real projects relevant to their lives. PjBL enriches students' learning experience by integrating theory and practice and increases engagement and deep understanding of concepts. Involving students in the project creation process gives them the space to explore creative ideas and solve real challenges, thus improving the overall quality of learning outcomes. Therefore, PjBL is proven to be a comprehensive and impactful learning approach that enhances students' creativity, creates a more meaningful learning experience, and supports achieving more optimal learning outcomes.

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