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Increasing Students' Creative Thinking Through Differentiated Learning with an CRT-Integrated PjBL Model

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ABSTRAK
Berpikir kreatif penting untuk ditingkatkan karena menjadi modal dasar untuk masa depan siswa. Berpikir kreatif siswa di SMAN Arjasa berdasarkan hasil observasi masih rendah. Tujuan penelitian ini adalah untuk meningkatkan berpikir kreatif siswa melalui penerapan pembelajaran berdiferensiasi model *Project Based Learning* (PjBL) terintegrasi *Culturally Responsive Teaching* (CRT). Jenis penelitian adalah penelitian tindakan kelas yang terdiri dari 2 siklus meliputi tahapan *plan, act, observe* dan *reflect*. Analisis data menggunakan *paired sample t test* untuk mengetahui adanya perbedaan pada setiap siklus, dan analisis n-gain untuk mengetahui besar peningkatan berpikir kreatif siswa. Hasil penelitian menunjukkan penerapan pembelajaran berdiferensiasi model PjBL terintegrasi CRT mampu meningkatkan berpikir kreatif siswa di setiap siklus pada pembelajaran biologi. Pembelajaran sesuai kebutuhan belajar siswa dan terintegrasi budaya memberikan pengalaman belajar yang lebih bermakna bagi siswa.
Kata kunci: Berpikir Kreatif; *Culturally Responsive Teaching;* Pembelajaran Berdiferensiasi; *Project Based Learning.*

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ABSTRACT
Students' creative thinking skills need to be continuously improved. However, the creative thinking of students at SMAN Arjasa (Arjasa Senior High School) based on the observation results is still low. This research aimed to improve students' creative thinking skills through the application of differentiated learning models of Project-Based Learning (PjBL), integrated with Culturally Responsive Teaching (CRTs). This research employed classroom action research, consisting of 2 cycles including planning, acting, observing, and reflecting. The data were analyzed using a Paired Sample t-Test to determine the differences in each cycle, and an n-gain analysis was used to determine the increase in students' creative thinking skills. The results showed that the application of differentiated learning with the PjBL integrated with CRT was able to improve students' creative thinking skills in the biology subject. Learning according to students' characteristics and cultural integration provides a more meaningful learning experience for students.
Keywords: *Creative thinking; Culturally Responsive Teaching; Differentiated Instruction; Project Based Learning.*

INTRODUCTION

During the Covid-19 pandemic, there was a crisis in all sectors, including education. In response to this, Indonesia issued the Merdeka (independent) curriculum that aimed to give freedom to teachers and students to explore and develop their potential. Kemendikbud (2022) explains that recovering the education system from the learning crisis cannot be realized through changes in curriculum alone. It requires various strengthening efforts, one of which is strengthening teachers' skills.

One strategy in implementing the Merdeka curriculum is differentiated learning (DL). DL proposes a rethinking of management structures and classroom content, so students are more involved in the learning process (Subban, 2006). DL can be defined as a student-centered instructional approach that accommodates students' diverse learning needs and can be used as a framework (Gaitas & Alves Martins, 2017). Tomlinson, (2005)) argues that to implement DL, teachers are required to know three things: students' level of readiness (level of knowledge) about certain subjects, students' interests (topics that make students interested), and students' learning profiles (the ways in which students learn best). The implementation of PB also has a positive impact on 21st-century skills, one of which is students' creative thinking skills (Zubaidah et al., 2017;Anggareni & Hidayat, 2022; Bobi & Ahiavi, 2023).

Creative thinking skills help students to solve the problems they have, and become more independent, reliable, talented, and skillful in the future (Ersoy & Başer, 2014; Syahrin et al., 2019; Astuti et al., 2020). Other than that, learning biology requires an understanding of concepts that emphasize creative thinking (Fardhila & Istiyono, 2019;Handayani et al., 2021). The observation results using creative thinking test sheets based on indicators by Greenstein (2012) on class X-6 students at SMAN Arjasa were still relatively low, with a mean of 69,9, which is below the school's minimum completion criteria of 80. Consequently, efforts needed to be made to improve students' creative thinking skills.

Efforts to improve students' creative thinking by implementing the PjBL learning model in the learning process. PjBL is a learning model that uses a constructivist approach that provides students with the opportunity to explore real-world problems and challenges, simultaneously developing cross-curricular skills while working in groups (Masrom and Yusof 2013; Al-Balushi and Al-Aamri 2014). PjBL makes a positive contribution in improving creative thinking (Putri, Sumiati, and Larasati 2019; Yamin et al. 2020; Yunita et al. 2021; Biazus and Mahtari 2022).

Implementing PjBL to make it more meaningful for students requires the Culturally Responsive Teaching (CRT) approach. Gay (2015) defines CRT as using the inherited experiences and perspectives of different ethnic and racial groups to teach students to understand their culture. Based on the results of previous research by Zubaidah & Arsih, (2021) the learning process using the CRT approach can make a positive contribution to students' creative thinking skills. Moreover, based on the problems mentioned, action is needed to develop students' creative thinking skills in biology learning through the implementation of PjBL differentiated learning, integrated with the CRT.

METHOD

This research was classroom action research which consisted of 4 stages, namely planning, acting, observing, and reflecting (Kemmis & McTaggart, 2007). The research subjects were 34 students of class X-6 at SMAN Arjasa during the 2nd semester of the 2022/2023 academic year. This research was conducted in May - June 2023 with 2 cycles consisting of 4 meetings. Cycle I covered waste-recycling material and cycle II discussed conventional biotechnology materials. There were two observers in the implementation of PTK and the observations were carried out during the learning process. The instruments used were an observation sheet on the implementation of PjBL syntax and a creative thinking test sheet (Pretest and Post-test) based on Greenstein, (2012). The data were then analyzed using a Paired Sample t-Test to determine the effect of actions. Meanwhile, the increase in creative thinking skills was analyzed using the n-gain according to Hake, (1999).

RESULTS AND DISCUSSION

The learning process included preliminary activities, core activities containing the PjBL stages, and closing activities. The implementation results of the learning syntax by observers in cycles I and II were 100%, meaning that all stages of PjBL could be implemented. The results of the syntax implementation can be seen in Table 2.

Table 2. The Implementation of the PjBL Syntax

Meeting	Cycle	Percentage
1	I	100%
2		100%
3	II	100%
4		100%

Students' creative thinking was measured based on indicators according to Greenstein, (2012) which included 6 indicators, namely curiosity, fluency, originality, elaboration, suitability, and flexibility. Based on the results of the Paired Sample t-Test analysis, there was a significant difference in students' creative thinking skills before action and after action in Cycle I and Cycle II. The results of the Paired Sample t-Test for students' creative thinking are presented in Table 3.

Table 3. Paired Sample t-Test Result

Action	Sig.	Description
Cycle I	0,001	Effective
Cycle II	0,000	Effective

Based on Table 3, the actions taken in Cycle I had a Sig value of <0.05, meaning that the actions given were effective in improving students' creative thinking. Likewise, Cycle II had a Sig value <0.05, which means that the actions taken in Cycle II were effective in improving students' creative thinking.

The results of the n-gain analysis and the average student creative thinking scores are presented in Table 4 below.

Table 4. Average Creative Thinking Score

Action	Mean	*n-gain*	Category
Cycle I	81,31	0,31	Medium
Cycle II	84,55	0,67	Medium

Based on Table 4, it is known that there was an increase from Cycle I to Cycle II with an n-gain of 0.31 to 0.67, even though both Cycles were still classified in the Medium Category.

The results of the n-gain analysis and the average creative thinking score for each indicator are presented in Table 5 below.

Table 5. Average Creative Thinking Score for Each Indicator

Indicator	Cycle I				Cycle II			
	Pre	Post	n-gain	Category	Pre	Post	n-gain	Category
Curiosity	3,18	3,18	0	Low	3,53	3,38	-0,31	Low
Fluency	3,09	2,71	-0,41	Low	1,68	2,94	0,54	Medium
Originality	2,97	3,11	0,13	Low	1,76	3,26	0,67	Medium
Elaboration	3,06	3,37	0,33	Medium	2,62	3,50	0,63	Medium
Suitability	2,68	3,40	0,54	Medium	2,06	3,47	0,72	High
Flexibility	2,53	3,66	0,76	High	0,79	3,74	0,91	High

Table 5. shows that there is one creative thinking indicator that students' curiosity did not increase and remained in the low category. Therefore, efforts were still needed to increase it. Fluency, Originality, Elaboration, and Suitability had improved from being in the low category to the medium category. Furthermore, students' flexibility in Cycle I and Cycle II was high and needed to be maintained.

The application of differentiated learning through CRT-integrated PjBL in this research was able to improve students' creative thinking. These results were supported by Nurhikmayati & Sunendar, (2020) who state that the implementation of CRT integrated PjBL can improve students' creative thinking. Another research conducted by Islamiati & Irfan, (2022) also applied the ethnochemical integrated PjBL model as a solution to realize innovative learning can improve students' creative thinking. This is because the learning process is based on local wisdom, thereby enabling students to develop their potential to face various environmental problems and encourage better learning outcomes.

The implementation of differentiated learning is done to adapt to students' learning needs based on their learning interests. Differentiated learning provides an opportunity for students to present the products they have designed, thereby encouraging students' creativity (Herwina, 2021). Soselisa et al., (2019) juga also show the influence of differentiated learning on students' high-level skills. The differentiated learning aspect in this research was limited to the product aspect only, so it did not apply the process and content differentiation aspects. We acknowledge that this is a shortcoming of the classroom action research that has been carried out. Therefore, it is necessary to implement other differentiation aspects in future research, such as process and content differentiation. The PjBL stages provide opportunities for students through systematic project assignments (Nita & Irwandi, 2021). In the PjBL learning

process, students face a problem that guides them in completing a particular project through investigating facts from various sources, compiling and analyzing plans to complete the project, getting feedback from both peers and teachers in evaluating and revising, so it can train hone creative thinking skills (Putri et al., 2018).

The CRT approach provides students with concrete knowledge about the culture in the area linked to learning materials, so that it will provide a more meaningful learning process for students. In line with the opinion of Zubaidah & Arsih, (2021) a culture-based learning approach can help curriculum planning guide teachers to create pedagogy that increases student motivation and performance. This way, culture, and traditions will be maintained, and learning competencies will be achieved meaningfully by students. Integrating culture into education functions as an innovation that can develop students' interest in the school subjects. Besides, it can lead students to a strong connection between learning experiences in the classroom and everyday life. Students can also develop patriotism, nationalism, and a strong sense of belonging to society.

Reflection on the learning process in Cycle I showed that students actively participated in the learning process. Students were more enthusiastic and active in answering questions from the teacher. For example, when responding to trigger questions, students were active in asking the teacher about the learning process. The application of differentiated learning regarding the product aspect was done by giving the group the freedom to choose the theme of inorganic waste utilization. As an application of independent learning, students suggested that the utilization of inorganic waste was done by the group members. This was because students wanted an equal group contribution in making the product. During the product collection, 3 groups collected products that did not correspond to the number of group members. The obstacle faced during Cycle I was that students' contribution was lacking in making waste utilization products. This was in line with research conducted by Sugandi, (2018) that the obstacles experienced in the learning process that implements the PjBL model are poor student contributions or collaboration in groups. The teacher's follow-up plan was to improve the guidance process for students so that their contributions or collaboration become better. Other than that, each student was asked to write about their own contribution.

The learning process in Cycle II showed that group discussions were more effective, and each member participated more actively. Therefore, the teacher’s action in improving guidance in the learning process can make students feel more comfortable and more enthusiastic. Students can also contribute their creative ideas in designing and executing their projects. The obstacle faced in Cycle II was found during the presentation. The gist of conveying information was not optimal because students were more focused on wanting to know the taste of fermented cassava products as an application of conventional biotechnology principles. Based on the results of this reflection, the teacher can apply discussion rules where each group determines the duration to present the results of their product with 1 representative of

each of the other groups tasting the product and providing criticism and suggestions to the presenting group.

CONCLUSION AND RECOMENDATION

The application of differentiated learning with the CRT-integrated PjBL model can improve students' creative thinking skills in Cycle I and Cycle II, with a mean score of 031, and 0.67 respectively in the medium category. The learning process becomes more meaningful for students because it links local and regional cultures with the materials being studied. Differentiated learning also provides freedom for students to explore their abilities in designing projects and demonstrating the results of their discussions. The weakness of this research is that the application of differentiated learning only focused on the product differentiation aspect. Therefore, we suggest teachers apply other differentiation aspects such as process and content aspects in differentiated learning to create independent learning that suits students' needs.

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