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Implementation of the Hybrid Flexible-Station Rotation Learning Model on Critical Thinking and Creativity Skills in Elementary Schools in Blitar

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Abstract: This study aims to evaluate the effectiveness of the Hybrid Flexible-Station Rotation learning model in enhancing critical thinking and creative abilities in elementary school students. The subjects were 133 class V students in Blitar Regency, divided into two groups: an experimental group using the Hybrid Flexible-Station Rotation model and a control group with conventional learning. The research instruments included pretests and posttests to measure critical thinking and creativity on topics such as stucture of the earth's layers, water cycles, and shapeof the earth's surface. The results showed a significant improvement in the experimental group compared to the control group, with an average post-test score of 72.07 for the experimental group and 70.06 for the control group. Paired t-test analysis confirmed a significant difference between the two groups. These findings affirm that the Hybrid Flexible-Station Rotation model is more effective in developing students' critical thinking and creative skills. The study recommends adopting this learning model as an innovative strategy in digital era education.

Keywords: Creativity; Critical thinking; Digital learning; Elementary school; Hybrid flexible-station rotation

Introduction

Elementary education plays a crucial role in meeting the diverse learning desires of students, which can help enhance their cognitive abilities and experience effective learning processes with the appropriate educational approaches. The evolution of elementary education in the digital era must equip learners with problem-solving skills, critical thinking, and the ability to collaborate with others (Beach, 2018; Rasmitadila et al., 2020). According to the National Education Association, 21st-century learning requires students to possess four essential components to compete in real life, commonly referred to as the 4Cs: critical thinking, creativity, communication, and collaboration (Roekel, 2018). Critical thinking refers to the ability of students to tackle various complex problems that arise in their daily lives and environments. This is achieved through planning and analysis that involve logical reasoning capabilities. Students are expected to address these challenges both independently and in group contexts. Additionally, students should have the ability to design, develop, and effectively communicate solution-oriented ideas to the community, which is a crucial aspect in the development of creativity (Hsu et al., 2019; Mercer et al., 2019; Mabruri et al., 2019). Students with high levels of creativity tend to have more open perspectives (Chen et al., 2020). In their role as mediators between students and knowledge, educators must provide space and appreciation for the opinions and arguments of students, especially in the context of creativity development (Redifer et al., 2021). This is important to foster self-confidence, build critical thinking abilities, and facilitate the exploration of new ideas that can enrich

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the learning process. Critical and creative thinking skills are essential skills in dealing with the ever-evolving impact of technology. The integration of modern technology into education has proven effective in enhancing students' critical and creative thinking skills by facilitating interactive and collaborative learning experiences (Антонова et al., 2024; Anwar et al., 2023; Wannapiroon & Petsangsri, 2020). Given the challenges faced in the 21st century, it is important for education to optimize the use of technology to develop the higher-order thinking skills needed (Lasmana et al., 2024). Therefore, the synergy between critical and creative thinking skills and the application of technology will prepare individuals to adapt to an ever-changing world.

The presence of technology in education has had a significant impact, enhancing interactivity in the learning process (Krajcik et al., 2023), and facilitating a shift from traditional face-to-face methods to more open educational models. This technology serves as a medium for interactive learning, enabling more dynamic relationships and fulfilling students' nearly unlimited need for information access (Alfi et al., 2016). In the context of life transformation in the digital age, the development of learning becomes critically important. The success of human resources in the 21st century also depends on students' abilities to develop critical thinking and creativity, which are key to addressing global challenges and opportunities (Frank, 2020). However, major challenges arise related to the existence of infrastructure and digital literacy which is still low among teachers and students, which causes the effectiveness of learning to often be less than optimal (DS et al., 2022). This has had a significant impact on the use of technology in learning, particularly at the elementary level in Indonesia. Technology acts as a bridge between teachers and students, ensuring the continuity of education under limited conditions (Zam, 2021; Muskania & MS, 2021). Information and communication technology (ICT) is expected to overcome this problem by providing students with access to more varied and interactive learning materials (Mahmudah et al., 2023). At the same time, technology integration also demands changes in teaching methods and pedagogical approaches to create a more dynamic and engaging learning environment (Tiara, 2022). Thus, innovation in educational technology must be balanced with increased user capacity, so that it can have a positive impact on improving the quality of basic education in Indonesia (Mufliva & Permana, 2024).

Several studies have examined issues in the teaching process at the elementary level in Indonesia. These findings indicate that educators tend to still use teacher-centered learning models. While this approach remains relevant for certain basics in lower grades, its uniform application across all elementary levels negatively impacts learning outcomes (Aryanis & Nugroho, 2023; Rachmadtullah et al., 2022). Other research suggests that elementary-level students, particularly in structure of the earth's layers, water cycle, and shape of the earth's surface, struggle to understand information presented by educators (Fadiyah et al., 2024). Based on findings from various studies, educators have not placed sufficient focus on developing students' critical thinking and creativity during the learning process. To address this issue, the implementation of a flexible and easily applicable learning model is necessary. Such a model is expected to be effective in delivering material while simultaneously enhancing students' critical thinking and creativity in innovation. Referring to the existing problems and ensuring that each individual can learn according to their own style, a learning model that integrates collaborative activities within groups with independent learning is needed. In this context, the Hybrid Flexible-Station Rotation learning model offers an appropriate solution, as it is designed to accommodate these needs by combining various responsive and adaptive learning approaches. A unique aspect of the Hybrid Flexible-Station Rotation model is that it allows students to choose materials of interest or that they understand at each educator-provided "learning checkpoint." The implementation of the Hybrid Flexible-Station Rotation model adopts a syntax from Larsari et al. (2023) and Yılmaz & Fırat (2024), which includes teacher-led instruction, collaborative activities, and online instruction. Students participate in each available post and move between stations as directed by the educator, ensuring all groups experience each station. As it evolves, the learning model is applied in a hybrid manner, allowing it to be fully implemented in both online and offline contexts simultaneously. Based on the discussion presented, it is important to conduct further research on the impact of the Hybrid Flexible-Station Rotation learning model on students' critical thinking and creativity abilities. It is hoped that this model has the potential to become an effective and efficient alternative in learning implementation.

Methods

This study used a quasi-experimental design involving experimental and control groups. The research design used was the pre-test and post-test control group design. The sample was divided into two groups, where the experimental group used the Hybrid Flexible-Station Rotation learning model, while the control group implemented a conventional learning model. This research design was utilized to assess the

response of the subjects to the given stimuli (Creswell, 2009). The design used for this study is visualized in Table 1.

The study was conducted in four public elementary schools in Blitar Regency. The selection of four public elementary schools, each representing one district in Blitar Regency, aimed to obtain a more comprehensive sample variation and representation. Subject selection in this study used cluster random sampling. The number of students involved in this research was 133 class V students, with 66 students in the experimental class implementing the Hybrid Flexible-Station Rotation learning model, and 67 students in the control class using conventional learning methods. The ages of participants ranged from 10 to 11 years (Class V), and the sample comprised both male and female students.

Table 1. Research design

Group	Pretest	Treatment	Posttest
Experimental	O^1	X	O^2
Control	O^1	–	O^2

Data analysis techniques included descriptive statistics, prerequisite tests (Normality and Homogeneity Tests), and hypothesis testing using the paired t-test. The hypothesis test was used to determine differences in the dependent variable before and after treatment in each group. The study utilized paired t-tests, with a hypothesis rejection decision at the 0.05 significance level.

Results and Discussion

The learning achievements of the students were measured through an essay test that had been validated by experts. To identify improvements in learning outcomes, a pre-test was initially conducted as a preliminary evaluation step. The research was carried out with class V elementary school students and covered topics on structure of the earth's layers, water cycle, and shape of the earth's surface. Data collection occurred over five sessions, consistent between the experimental and control classes. The first session involved an introduction to the research and the administration of a pre-test on critical thinking and creativity.

Figure 1. Implementing the Hybrid Flexible-Station Rotation learning model

Sessions two to four involved treatments using the Hybrid Flexible-Station Rotation learning model (experimental class) and the conventional learning model (control class). In the fourth session, final data (post-test) were collected. Learning was conducted both online and offline simultaneously, facilitated by the Zoom Meeting application.

Results of the study show, the pretest on critical thinking and creativity related to structure of the earth's layers, water cycle, and shape of the earth's surface conducted before the commencement of learning activities yielded an average score of 53.69 and posttest results in the experimental class achieved an average score of 72.07, look at Table 4. Meanwhile, results of the pretest and posttest in the control class also showed an improvement in critical thinking and creative abilities, from an average pretest score of 50,06 to a posttest average of 70.06, look at Table 5.

Figure 2. Pretest results

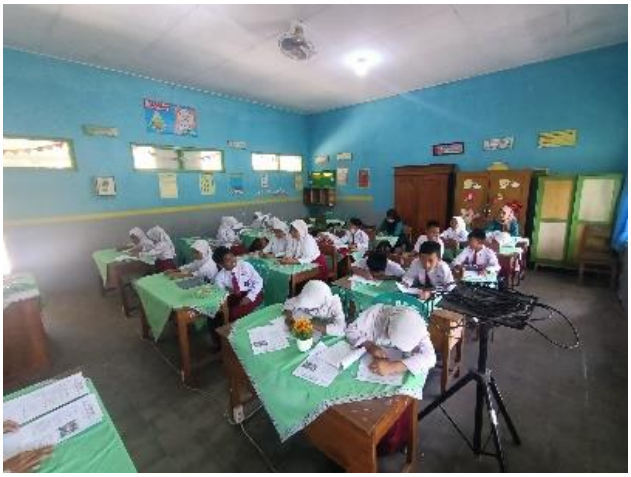

Figure 3. Posttest results

The normality of the posttest data for both the experimental and control groups for each capability was assessed using the Kolmogorov-Smirnov test. The results are presented in Table 2.

Table 2. Normality test

Capability	Model	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
Critical Thinking & Creativity	Hybrid Flexible–Station Rotation	0.109	63	0.060
	Conventional	0.092	63	0.200

The next step involved using Levene's Test to assess the homogeneity of posttest data. The analysis results are displayed in Table 3.

Table 3. Test for homogeneity

Variable	Significance	Status
Critical Thinking and Creativity	0.623	Homogeneous

The data collection results were statistically analyzed to test the hypothesis, utilizing the paired t-test. The values used in the paired t-test calculations were the pretest and posttest scores for each group. The data processing results are shown in Table 4.

Table 4. Test for differences in dependent variables in the experimental group

Variable	Pair	Mean	Sig. (2-tailed)	Status
Critical Thinking & Creativity	Pre-test	53.69	0.000	Significant
	Post-test	72.07		

Table 5. Test for differences in dependent variables in the control group

Variable	Pair	Mean	Sig. (2-tailed)	Status
Critical Thinking & Creativity	Pre-test	50.06	0.000	Significant
	Post-test	70.06		

Based of Table 5, it is evident that there are significant differences between before and after the treatment for each dependent variable. Therefore, it can be concluded that there is a significant difference after treatment with the Hybrid Flexible–Station Rotation learning model. Similarly, in the control group, there are significant differences, although the differences are relatively small compared to those in the experimental group.

The Hybrid Flexible-Station Rotation learning model is an innovative and unique approach that flexibly adapts to the needs of learners and the educational environment (Larsari et al., 2023). This model offers high adaptability in integrating various learning methods, both face-to-face and online, thereby optimizing to enhance student engagement and interaction (Yılmaz & Fırat, 2024; Lonigro, 2021).

This learning model provides significant advantages in the learning process. Previous research indicates that the implementation of the Station Rotation model allows learners to acquire knowledge more effectively (Govindaraj & Silverajah, 2017). Further studies suggest that this model offers opportunities for learners to study according to their individual characteristics and learning styles (Latif et al., 2024). With its learner-centered approach, this model enhances engagement, deepens understanding, and enables both independent and collaborative exploration of material, thus creating a more adaptive and inclusive learning environment.

The Hybrid Flexible-Station Rotation learning model holds substantial potential as an effective choice for fostering and enhancing students' critical thinking and creativity skills. This assertion is evidenced by the post-test results, showing that the average scores in the experimental class had a more significant impact than those in the control class. This study aligns with the findings by Wahyudi et al. (2023), Oktarianto et al. (2023), and Sulistyanto et al. (2023), which indicates that hybrid learning technologies and station rotation have a positive impact on critical thinking abilities. Other research also shows that the application of blended learning positively influences the enhancement of students' creativity (Irwansyah et al., 2023).

Conclusion

This study confirms that there is a significant difference after treatment with the Hybrid Flexible–Station Rotation learning model. Similarly, in the control group, there are significant differences, although the differences are relatively small compared to those in the experimental group. Based on these results, it can be stated that the Hybrid Flexible-Station Rotation learning

model can significantly enhance critical thinking and creativity skills among elementary school students. By integrating collaborative and independent learning approaches, this model not only accommodates various learning styles of students but also provides space for exploration and innovation. The post-test results show that students involved in this model achieved higher average scores compared to those who followed conventional learning methods. Therefore, the implementation of this model can be an effective solution to overcome challenges in the learning process in the digital age and to prepare students with relevant skills for the 21st century. This research contributes to the impact of technology-based learning and its flexibility in enhancing learning outcomes.

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Conflicts of Interest
The authors declare no conflict of interest.

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