

Exploring the Role of Self-Efficacy in Station Rotation: Enhancing Critical Thinking and Literacy Skills Among Primary Learners

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The aim of the research is examining how the Station Rotation model and self efficacy in their abilities affect their critical thinking and literacy skills in primary schools. The Station Rotation model allows students to engage in various learning activities across different stations. Self-efficacy, the belief in one's abilities to achieve tasks, both are examined for their influence on educational outcomes. The study engaged 203 students with ages ranging from 10 to 11 years from 5 schools in Malang City, Indonesia. The research was facilitated online via Zoom Meeting: the experimental group was exposed to the Station Rotation model, while the control group underwent traditional teaching. The participants were chosen through cluster random sampling based on geographic locations. The study employed a quasi-experimental structure with both pre-test and post-test control group configurations. Instruments used included 30 self-efficacy queries, 5 critical thinking assessments, and 20 literacy evaluations. Reading scores were further examined using the SMOG formula. The gathered data underwent manual multivariate examination using Hahs-Vaughn's formula. Key findings indicated: 1) the Station Rotation model significantly boosted students' critical thinking ($\text{sig}=0,000$) and literacy abilities ($\text{sig}=0,002$); 2) varying self-efficacy levels notably impacted learning results in critical thinking ($\text{sig}=0,044$) and literacy ($\text{sig}=0,046$); and 3) no discernible correlation existed between the teaching models and self-efficacy regarding critical thinking ($\text{sig}=0,691$) and literacy abilities ($\text{sig}=0,262$). This methodology provides insights for educators, emphasizing its suitability for online use, especially during resource-limited times like pandemics.

Keywords: station rotation model; self-efficacy; critical thinking; literacy skill; quasi-experimental design.

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Исследование роли самоэффективности в модели ротации станций: повышение критического мышления и навыков грамотности среди младших школьников

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Цель исследования — изучить, как модель ротации станций и самоэффективность влияют на критическое мышление и навыки грамотности в начальной школе. Модель ротации станций позволяет учащимся выполнять различные учебные действия на разных станциях. Самоэффективность, вера в свои способности выполнять задачи — оба этих аспекта исследуются на предмет их влияния на образовательные результаты. В исследовании участвовали 203 учащихся в возрасте от 10 до 11 лет из 5 школ города Маланг, Индонезия. Исследование проводилось онлайн через Zoom Meeting: экспериментальная группа работала по модели ротации станций, в то время как контрольная группа занималась по традиционной методике. Участники были выбраны методом кластерной случайной выборки на основе географического расположения. Исследование использовало квазиэкспериментальную структуру с конфигурацией контрольной группы с предтестом и посттестом. Используемые инструменты включали 30 запросов на самоэффективность, 5 оценок критического мышления и 20 оценок грамотности. Уровни чтения до-

полнительно проанализировали с использованием формулы SMOG. Собранные данные подверглись мануальному многовариантному анализу с использованием формулы Хас-Вон. Основные результаты показали: 1) модель ротации станций значительно улучшила критическое мышление учащихся ($\text{sig}=0,000$) и способности к грамотности ($\text{sig}=0,002$); 2) различные уровни самооффективности заметно повлияли на результаты обучения критическому мышлению ($\text{sig}=0,044$) и грамотности ($\text{sig}=0,046$); 3) между методами обучения и самооффективностью в отношении критического мышления ($\text{sig}=0,691$) и способности к грамотности ($\text{sig}=0,262$) не было обнаружено заметной корреляции. Эта методология предоставляет ценные идеи для педагогов, подчеркивая ее пригодность для онлайн-применения, особенно в условиях ограниченных ресурсов, например, во время пандемий.

Ключевые слова: модель ротации станций; самооффективность; критическое мышление; навыки грамотности; квазиэкспериментальный дизайн.

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Introduction

Literacy skill is a crucial component in processing information. All knowledge and intelligence can be obtained from oral or written forms. To effectively acquire knowledge through writing, one must possess literacy skill, specifically in reading comprehension. This reading comprehension skill can help students understand most information easily. The outcomes of this comprehension can enhance the analytical reasoning abilities among learners. Such reasoning ability encompasses the capacity to partake actively in contemplative and independent thought. Understanding terms like literacy skills, critical thinking, and self-efficacy is crucial because they lay the foundation for students not only to absorb information but also to analyze, evaluate, and apply it in real-life situations. These skills are critical in preparing students for the challenges of the 21st century, where the ability to think independently and adapt to change is key to success. Individuals who can

think critically generally can trust themselves to solve problems. In other words, individuals who can think critically are individuals who can make decisions and formulate their opinions independently [11; 21].

The connection between literacy comprehension and analytical reasoning abilities has been extensively explored in various academic studies. Herman [16] in his research argues that reading comprehension involves more than just recounting the content of a text; it requires a process of thoughtful engagement. This process is where critical thinking skills come into play. For instance, a student might read a passage about a historical event and simply list the facts mentioned, without considering the wider context or implications of these facts. In contrast, a student who engages in a thoughtful process while reading would analyze the information, consider different perspectives, and draw connections to other events or ideas. Research has shown that when individuals engage in critical reading, their critical

thinking skills also improve, suggesting a close relationship between the two [7; 30]. Reading is fundamentally a process of learning through constructing meaning. An example of this in primary school students might involve a teacher presenting a short passage about animals living in the jungle. The teacher could then ask the students to identify the main idea, make connections and inferences, and evaluate the author's credibility. By participating in these activities, students are not just passively reading; they are actively constructing meaning from the text and developing their reading comprehension skills.

The ability to think critically and read comprehensively is closely linked to the concept of self-efficacy in individuals. The term self-efficacy in this research is specifically defined as an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments, reflecting confidence in the ability to exert control over one's own motivation, behavior, and social environment. Self-efficacy plays a significant role in cognitive development and is a key factor in academic outcomes for students [37]. This relationship is further supported by research conducted by Olivier [29] which suggests that the level of academic goals set by students can influence their academic performance. In other words, a student's confidence in tackling problems contributes significantly to their success in developing critical thinking and literacy skills. Essentially, when students believe in their capabilities, they are more likely to engage deeply with reading materials, apply critical thinking skills, and achieve higher levels of understanding and academic performance. This highlights the importance of nurturing self-efficacy in educational settings to enhance students' literacy and critical thinking abilities.

According to the National Education Association [31], to be competitive in 21st-century learning, students must develop proficiency in four key areas: creativity, collaboration, communication, and critical thinking. Specifically focusing on critical thinking skills, students are expected to have the ability to navigate complex challenges they encounter daily. This involves identifying problems and applying logical reasoning and analysis to find solutions for unforeseen dilemmas [27].

The development of these critical thinking skills is not confined to specific subjects or situations; rather, they should be integrated into all aspects of education. This means that students should be encouraged to practice and apply these skills in every lesson, whether working in groups or individually. The emphasis is on making the ability to interpret and analyze information a familiar and integral part of their learning process, ensuring they are well-equipped for the challenges of the 21st century [18; 44].

The presence of technology in the world of education makes a positive contribution to learning; learning becomes more interactive [38]. One of the biggest impacts in the world of education is the emergence of a new paradigm in learning without boundaries of distance and time. With the presence of technology in learning today, educators can use online learning as an effective educational mode [12; 36].

Several studies have shed light on teaching challenges at the primary school level in Indonesia. A preliminary study conducted in 2021 focused on grade 5 teachers in primary schools across three cities in East Java Province, Indonesia — Malang, Gresik, and Mojokerto. This study found that many teachers still relied heavily on a teacher-focused learning model [28]. While this approach may still be relevant for teaching basic concepts to students in lower grades, its continual use across all levels of primary school has been linked to lower student learning outcomes, as indicated by achievement value indicators [2; 33]. Furthermore, research by Sarwanto [39] highlights that some fifth-grade students, particularly in science, struggle to understand information presented in teacher-led sessions. These studies collectively suggest that current teaching methods in Indonesia's primary schools may not adequately support the development of students' critical thinking and literacy skills. Addressing this issue requires the adoption of a learning model that is both flexible and user-friendly, one that can effectively enhance students' critical thinking and literacy capabilities. This shift in teaching approach is essential for fostering more engaged, thoughtful, and literate students who are better equipped for academic success.

If we consider the results of collaborative research conducted by the Indonesian Government and a private survey institute [25], Indonesia's digital literacy index score currently stands at 3,49, placing it at a medium level. This indicates that the Indonesian population is generally prepared for the integration of technology in learning, whether in a blended format (combining traditional face-to-face teaching with online methods) or through fully online courses. This medium-level score suggests that while there is a substantial degree of readiness and capability among Indonesians to engage with digital learning platforms, there may still be areas that require further development to fully leverage the potential of technology in education. This readiness is crucial for the effective implementation of technological tools and methods in the learning process, aligning with global trends towards more digitalized and accessible education.

Addressing the current educational challenges and accommodating different learning styles necessitate a learning model that effectively combines group work and individual activities. The Station Rotation model presents a viable solution for this need. In this educational approach, the primary activity centers around 'learning checkpoints'. The Station Rotation model involves various stages, including teacher-led direct instruction, group-based collaborative activities, and elements of online learning [10]. In practice, the model starts with each student listening to material explanations from the teacher. Subsequently, students are divided into several groups, corresponding to the number of stations or checkpoints prepared. Typically, there are three or more stations. The activities at these stations vary, including both group and individual tasks, with at least one station dedicated to online learning [49]. Students rotate through each station according to the teacher's guidance, ensuring that all groups experience every station [17]. Over time, the Station Rotation model, originally designed for blended learning, has undergone adaptations to suit fully online learning environments. This study utilizes the syntax of the Station Rotation learning model in its online version, as developed by Julie Mason [23] and Catlin Tucker [47]. The flexibility of

this modified model allows for its implementation in both blended (offline and online) formats and exclusively in online settings. With these adaptations, the model caters to a range of learning environments and preferences, offering a dynamic and versatile approach to modern education.

Several studies have highlighted the benefits of using the Station Rotation model in educational settings. This model contributes significantly to creating a dynamic and engaging atmosphere for both teachers and students in each lesson [6; 40]. Its structure, which includes learning in groups, individually, and through various activities, enhances the effectiveness of teachers, particularly in large class settings [48]. However, while acknowledging the positive aspects of this learning model, it's also important for educators to consider the facilities and infrastructure required. For instance, classroom size is a crucial factor; there needs to be sufficient space to allow students to move comfortably during the rotation stages. This requirement is especially relevant in traditional, in-person learning environments where physical space can be a constraint. Nonetheless, many of these challenges can be mitigated with the advancement of information technology. The evolution of digital tools and platforms enables more flexibility in how the Station Rotation model can be implemented, particularly in settings where physical space is limited. For example, online and blended learning formats can accommodate the Station Rotation model without the need for large physical spaces, thereby broadening its applicability and effectiveness in various educational contexts. This adaptability is key in ensuring that the Station Rotation model remains a viable and effective approach in modern, diverse educational landscapes.

Based on the information provided, this research explores how 'self-efficacy' and the 'Station Rotation model' interact to influence students' critical thinking and literacy skills, positing that higher levels of self-efficacy among students can significantly enhance the effectiveness of the Station Rotation model in developing these essential skills. Integrating teaching models with digital tools like Zoom Meeting in this context offers the potential for a more effective and efficient approach to conducting learning

activities. The practical significance of this study lies in its potential to inform educational strategies, providing evidence-based insights into how enhancing students' self-efficacy can lead to better academic outcomes in critical thinking and literacy through the implementation of the Station Rotation model. To gain a deeper understanding of the research conducted, examining the accompanying concept map image (Fig. 1) is recommended. This image visually represents

the research, highlighting the main concepts and ideas, and illustrating the connections between them. A concept map serves as a valuable tool for quickly grasping the essence of the research, making it easier to comprehend the relationships among various elements of the study. This approach can be instrumental in enhancing your understanding of how the Station Rotation model impacts critical thinking and literacy skills in the context of modern educational methods.

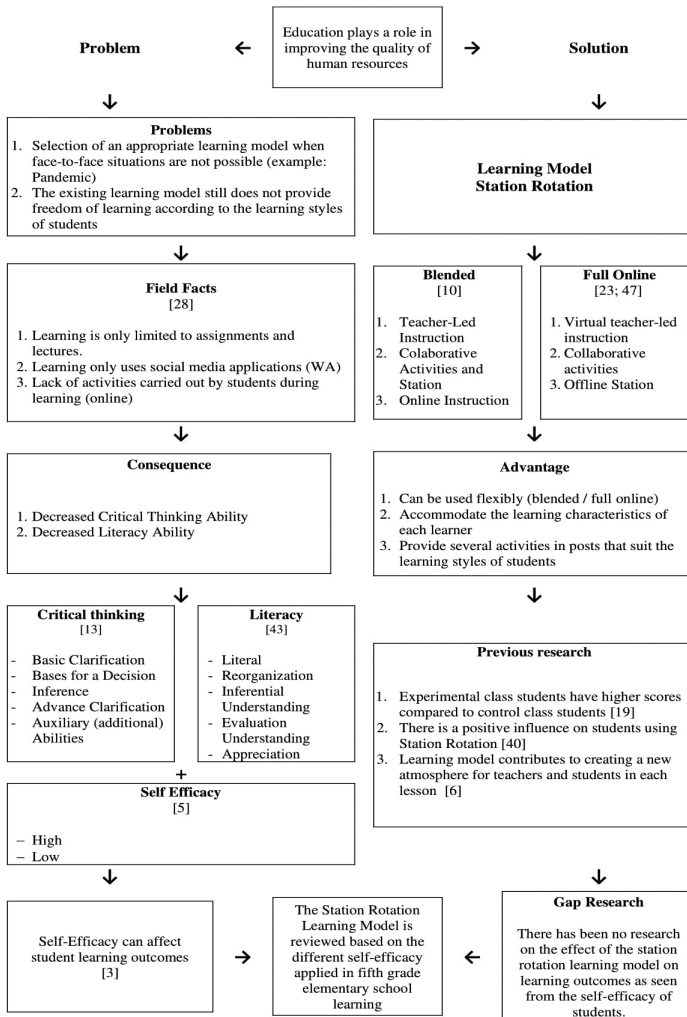


Fig. 1. Conceptual framework

Method

This study employed a quasi-experimental nonequivalent control group design, dividing the sample into two groups: the experimental group, which utilized the station rotation model, and the control group, which followed the conventional model. Both groups underwent pre-testing, but only the experimental group received the model intervention. Following the intervention, both groups were subjected to a post-test. The experiment's design was a factorial one. A factorial design was chosen because this study also took into account other independent variables, often referred to in research as moderating variables, with self-efficacy being one such variable. The factorial processing unit used was a 2x2 factorial. The design used for this research is depicted in the subsequent Fig. 2.

Participants

For this study, samples were gathered from five primary schools in Malang City, Indonesia, using a cluster random sampling method. In this approach, schools were grouped based on their respective sub-districts. This method enabled

the research team to select five schools, each representing one of the five districts in Malang City. From each selected school, an experimental class and a control class were then randomly chosen. The study involved a total of 203 fifth-grade students. These participants ranged in age from 10 to 11 years, typical for fifth-grade primary school students, and included both male and female genders. This diverse sample provided a comprehensive overview of the fifth-grade student population in Malang City, allowing for a more accurate and representative analysis of the effects of the Station Rotation model on students' critical thinking and literacy skills.

Instruments

In this study, three research instruments were developed to measure self-efficacy, critical thinking skills, and reading comprehension literacy skills. The self-efficacy instrument was adapted from the research of Simon Cassidy and Peter Eachus. This instrument was specifically chosen to accurately measure the self-efficacy levels of the participants in the context of the study. For assessing critical thinking skills, an instrument comprising five essay-type ques-

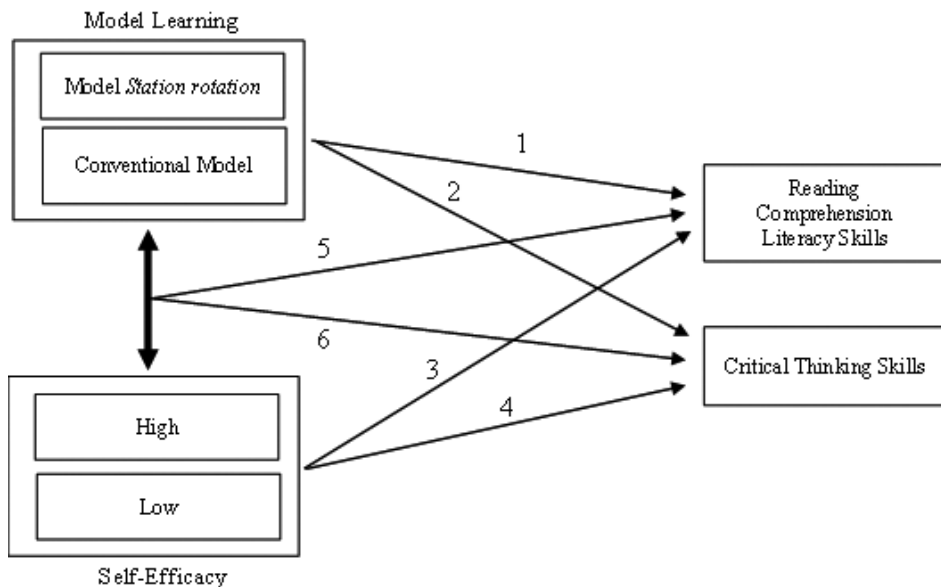


Fig. 2. 2 x 2 Factorial Design Scheme

tions was used. Each of these questions was designed to correspond to one of the five variables of critical thinking skills being measured. This approach allowed for a detailed evaluation of the students' abilities in various aspects of critical thinking. The instrument for evaluating reading comprehension literacy skills consisted of 20 multiple-choice questions. These questions were based on text readings that were calibrated using the Simple Measure of Gobbledygook (SMOG) formula, developed by Harry Mc Laughlin [24]. The texts used were specifically chosen to match the reading level of fifth-grade primary school students, ensuring the appropriateness and relevance of the assessment. The detailed representation of each indicator for the variables measured is outlined in Table 1. This table provides a clear breakdown of how each aspect of self-efficacy, critical thinking, and literacy skills was quantitatively assessed in the study, offering a comprehensive overview of the research instruments used.

especially useful in the context of the Station Rotation model, as it facilitates the division of students into different groups for various activities. The breakout room functionality allowed the students to be assigned to different 'posts' or 'stations' within the virtual environment. This setup is crucial for the success of the Station Rotation model, as it mimics the physical movement between stations in a traditional classroom setting. Additionally, the flexibility for students to freely select and move between rooms in Zoom further enhanced the interactive and dynamic nature of the learning process. The duration of the study was three months, allowing for a comprehensive implementation and evaluation of the Station Rotation model in an online format. This time frame provided sufficient opportunity to observe and analyze the effectiveness of the model in enhancing students' critical thinking and literacy skills, as well as their engagement and participation in the learning process. The use of Zoom and its breakout room feature thus played a pivotal role in facilitating an innovative and effective online learning environment.

Table 1

The Representation of Each Indicator of the Variables

Variable	Indicators
Self-Efficacy [5]	Low
	High
Critical Thinking Skill [13]	Basic.Clarity
	Bases.for.a.Decision
	Inference.
	Advance.Clarity
	Auxiliary (additional) Abilities
Reading Comprehension Literacy Skill [43]	Literal
	Reorganization
	Inferential Understanding
	Evaluation Understanding
	Appreciation

Data Collection

In this study, the Station Rotation learning model was implemented, with a particular emphasis on incorporating online components. Zoom meetings were chosen as the primary digital platform for their advantageous breakout room functionality. This feature of Zoom is

Learners participating in the experimental and control groups, which used the station rotation and traditional learning models respectively, completed a post-test. This post-test aimed to assess the students' critical thinking abilities related to the subject of animal and human movement organs. They responded to questions set by the teacher, which were designed based on critical thinking skill indicators.

Data were collected using 3 instruments, modified for the level of primary school students, including self-efficacy, pretest and posttest instruments (Critical Thinking Skill, Reading Comprehension Literacy Skill), which had been previously validated by two Ph.D. experts in Teacher Primary Education. These pretest and posttest instruments were re-validated by randomly testing 50 grade VI students (N=50) in five designated schools (10 random students each school with the same grade). Validity is measured using the Pearson Correlation, whereas reliability is calculated using the Cronbach's Alpha formula. The average score validity of the critical thinking skill instrument was 0,723, and the average

score validity of the reading comprehension literacy skill instrument was 0,682. The value was high, so it could be said that the instrument was valid. The reliability of the critical thinking skill instrument was 0,771, and the reliability of the reading comprehension literacy skill instrument was 0,940. Therefore, it could be said that the instrument was reliable. The detailed representation of each score for the variables measured is outlined in Table 2.

After verifying validity and reliability, empirical data for the experimental group and control group was successfully collected. The traditional model used in this research is the typical teaching method employed by teachers during instruction. Consequently, the researchers did

not provide any special treatment to the control group. Before starting the research, measurements were taken of the level of self-efficacy of all samples in the two groups. To quantify the degree of student self-efficacy, the self-efficacy questionnaire developed by Simon Cassidy and Peter Eachus was exemplified. The students' self-efficacy scores were then divided into two categories: high and low. The pre and post-test instruments given to students were based on tests of critical thinking and reading comprehension literacy skills. The duration of data collection for this research spanned over a period of three months, concluding with the gathering of post-test data at the end of the learning phase.

Table 2
Validity and Reliability Scores of Pretest and Posttest Instruments

Variable	Question	Score Validity (Pearson Correlation)	Sig (2-tailed)	Score Reliability (Cronbach's Alpha)
Critical Thinking Skill	1	0.726	0.000	0.771
	2	0.697	0.000	
	3	0.699	0.000	
	4	0.781	0.000	
	5	0.711	0.000	
Literacy Skill	1	0.630	0.000	0.754
	2	0.647	0.000	
	3	0.536	0.000	
	4	0.590	0.000	
	5	0.538	0.000	
	6	0.730	0.000	
	7	0.691	0.000	
	8	0.620	0.000	
	9	0.676	0.000	
	10	0.731	0.000	
	11	0.536	0.000	
	12	0.628	0.000	
	13	0.630	0.000	
	14	0.624	0.000	
	15	0.801	0.000	
	16	0.677	0.000	
	17	0.329	0.020	
	18	0.730	0.000	
	19	0.508	0.000	
	20	0.654	0.000	

Data Analysis

Preliminary tests were conducted on the data obtained from the study. These prerequisite tests included normality and homogeneity tests. Given that the sample size of the study was more than 30, the Kolmogorov-Smirnov test was employed to assess the normality of the data. This test is commonly used in statistics to determine whether a sample comes from a specific distribution, in this case, to check if the data were normally distributed. The homogeneity of the data was tested using Levene's test method. This test is used to assess the equality of variances for a variable calculated for two or more groups. It's a crucial step in ensuring that the data meet the assumptions necessary for certain types of statistical tests. Both the normality and homogeneity tests were conducted using a significance level of 5% (0,05). This is a standard threshold in statistical testing, where a result below this level indicates that the result is statistically significant, while a result above it suggests that it's not.

After completing these preliminary tests, the study proceeded to hypothesis testing. The hypothesis was tested using Multivariate Analysis of Variance (MANOVA), following the formula described by Hahs-Vaughn [15]. MANOVA is a statistical test that is used to compare multivariate population means, and it's particularly useful in studies where multiple dependent variables

are involved. This method was chosen to effectively analyze the complex data set of this study, which included multiple variables related to the effectiveness of the Station Rotation model in education. The MANOVA analysis process is assisted using IBM SPSS v.25.

Results

This study evaluated the effectiveness of the Station Rotation model, enhanced with digital tools like Zoom, on improving students' critical thinking and literacy skills. Over a three-month period, learners engaged in a structured online environment, allowing for dynamic interaction and participation. The following findings present a comprehensive analysis of the impact of this instructional model on critical thinking abilities, literacy skills, and student self-efficacy. To gain deeper insights into the influence of this learning model, the subsequent table 3 provides a summary of data including mean, standard deviation, and the number of students in each group. This table aids in the clearer interpretation of research outcomes, visualizing differences between groups, and illustrating how significantly the Station Rotation model, coupled with the use of digital tools, enhances student learning outcomes.

The study meticulously conducted a multivariate analysis on the collected data, post-validation of key assumptions such as normality and homogeneity. The assessment of normal

Table 3

Descriptive Statistics (N=203)

Dependent Variable	Model	Self Efficacy	Mean	Std. Deviation	N
Critical Thinking Skill	Experiment	Low	0.560	0.221	45
		High	0.632	0.209	60
		Total	0.601	0.216	105
	Control	Low	0.412	0.194	41
		High	0.460	0.208	57
		Total	0.439	0.203	98
Literacy Skill	Experiment	Low	0.610	0.244	45
		High	0.640	0.248	60
		Total	0.627	0.245	105
	Control	Low	0.464	0.242	41
		High	0.572	0.240	57
		Total	0.527	0.246	98

distribution for students' N-Gain scores in critical thinking and reading comprehension literacy, influenced by the learning model was executed via the Kolmogorov-Smirnov test. In this context, the experimental group registered a normality score of 0,147 in literacy. While the control group exhibited a score of 0,200. Concurrently, in critical thinking, both groups demonstrated a score of 0,200. Given that these figures surpass the threshold value of 0,05, it was inferred that the N-Gain scores reflecting students' critical thinking and literacy aptitudes, as influenced by the learning model, adhered to a normal distribution. Furthermore, the outcomes of the homogeneity tests underscored a consistent pattern across the groups, with literacy skills showing a significance level of 0.983 and critical thinking skills presenting a level of 0,636, thereby confirming homogeneity in the data set.

The normality and homogeneity of data based on students' self-efficacy levels, were rigorously evaluated using N-Gain scores for critical thinking and reading comprehension literacy skills. The Kolmogorov-Smirnov test revealed that for critical thinking, scores at low and high self-efficacy levels were 0,089 and 0,200 respectively, while literacy skills consistently showed a score of 0,200 across both self-efficacy levels, indicating a normal distribution of data. Additionally, the homogeneity tests yielded values of 0,721 for critical thinking and 0,568 for literacy skills, confirming the homogeneity of the research data in relation to self-efficacy.

In this study, Multivariate Analysis of Variance (MANOVA) was employed to assess the impact of the instructional model and self-efficacy on two cognitive abilities: critical thinking skills and reading comprehension literacy skills.

The results obtained indicate that the instructional model adopted exerts a highly significant influence on both cognitive skills, with F values of 29,040 for critical thinking skills with a significance of 0,000 and 9,567 for reading comprehension literacy skills with a significance of 0,002. This denotes that the instructional model being tested has a strong and significant effect on enhancing both critical thinking and reading comprehension literacy skills.

Furthermore, self-efficacy perceived by the subjects also showed statistical significance in influencing both cognitive variables, with F-values of 4,099 for critical thinking skills with a significance of 0,044 and F-values of 4,035 for reading comprehension literacy skills with a significance of 0,046. This suggests that individuals' beliefs in their capabilities to learn and complete tasks related to critical thinking and reading comprehension are positively associated with improvements in these skills.

However, when the interaction between the instructional model and self-efficacy was analyzed, the results did not show statistical significance in affecting critical thinking skills ($F=0,158, p=0,691$) nor reading comprehension literacy skills ($F=1,264, p=0,262$). This indicates that there is insufficient evidence to assert that self-efficacy moderates the influence of the instructional model on the cognitive skills measured in this study. The detail of each value of the variables is as follows Table 4. For a detailed examination of the study's outcomes on participants' abilities, refer to Fig. 3, which presents the estimated marginal means for (a) critical thinking and (b) literacy skills. This figure illustrating the comparative analysis of these essential educational metrics throughout our research period.

Table 4

Tests of Between-Subjects Effects (N=203)

Source	Dependent Variable	F	Sig.	Partial Eta Squared
Model	Critical Thinking Skill	29.040	0.000	0.127
	Reading Comprehension Literacy Skill	9.567	0.002	0.046
Self-Efficacy	Critical Thinking Skill	4.099	0.044	0.020
	Reading Comprehension Literacy Skill	4.035	0.046	0.020
Model * Self-Efficacy	Critical Thinking Skill	0.158	0.691	0.001
	Reading Comprehension Literacy Skill	1.264	0.262	0.006

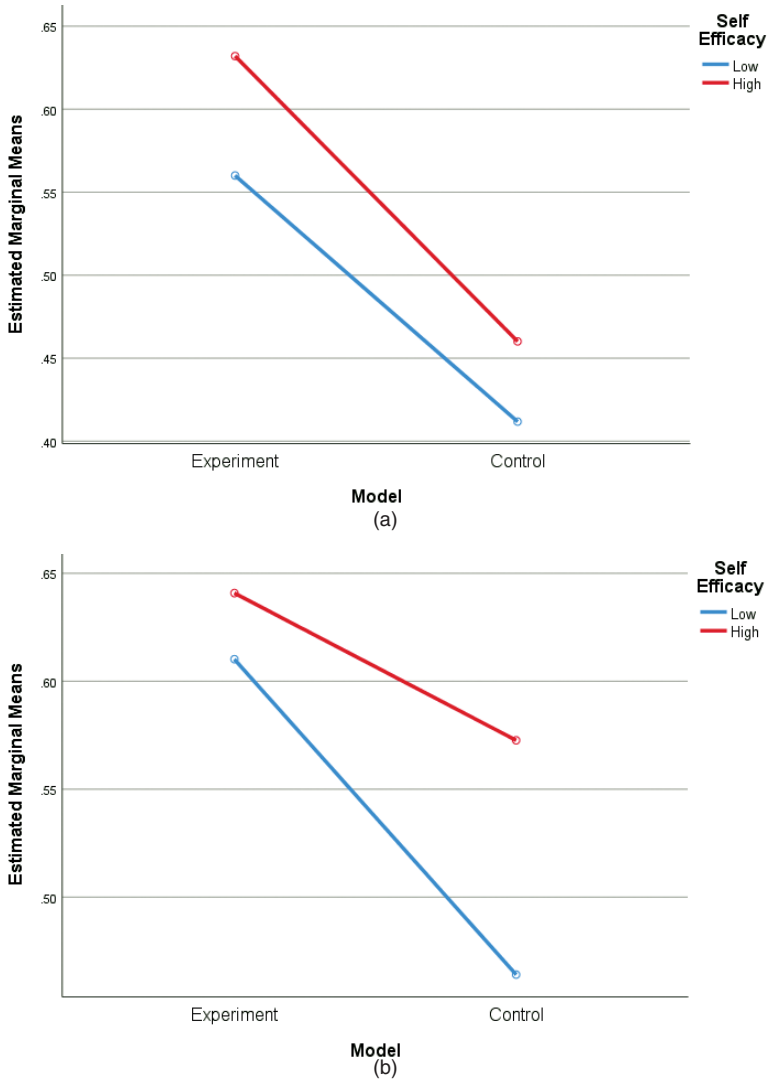


Fig. 3. Estimated Marginal Means for (a) Critical Thinking and (b) Literacy Skills

Discussion

Comparison of Critical Thinking and Literacy Ability in the Station Rotation Learning Model and Conventional Learning Model

Based on the results of the analysis using multivariate analysis, there were differences in

the learning outcomes of critical thinking skills and literacy skills of students who were taught using the Station Rotation learning model compared to those taught using the conventional model. The results of the comparison of the values between the experimental and control groups showed that the learning outcomes us-

ing the Station Rotation model were higher than those using the conventional model.

The Station Rotation learning model is a unique learning model that can be implemented flexibly, in both blended and fully online learning environments [23; 47]. One of the characteristics of this learning model is the combination of problem-solving activities carried out both in groups and individually. This model also provides many benefits. Previous research revealed that learning using the Station Rotation learning model allows students to learn knowledge in their own way, according to their characteristics [19; 26]. These results were based on activities that required students to study in groups and individually.

In building and advancing students' literacy and critical thinking abilities, the Station Rotation model can be considered a favorable model. This statement can also be inferred from the results of research when the educational achievements that have been carried out have a higher posttest average value than students who learn using conventional models. The findings of this investigation align with the study conducted by Lithoxidou [20] who suggests that technology-based learning can affect students' critical thinking ability. Studies by Budhyani [4] and Topping [46] also agree that the blended learning model gives students greater participatory discussion than the conventional model. By creating student discussion activities, it can affect thinking ability, both in the realm of primary school and even up to the college education level [41]. Similar research on the use of cooperative learning models on literacy ability from Christina [9] also confirmed that students who use the Station Rotation model get more information and knowledge than students who learn only by the conventional model.

Comparison of Critical Thinking and Literacy Ability on Self-Efficacy Level

This study obtained the results of the multivariate analysis which stated that there were differences in the results of critical thinking ability and reading comprehension literacy ability between students with high and low efficacy levels. Learning was carried out by all students who possessed critical thinking and literacy ability

both with high and low degrees of self-efficacy; they all got the same portion in their learning. Students worked in a group with various characteristics (heterogeneous). Students who had high self-efficacy helped and motivated students with low self-efficacy [32; 50], so good interaction between group members was constructed in group work.

The benefit was added by a learning characteristic that was carried out by mixing various group and individual activities in one lesson. After students practiced doing group activities by discussing with each other, they then tried to solve the problems individually at different stations. This kind of pattern fostered students' confidence in getting used to solving problems both in groups and individually [34]. These results are per the research conducted by Fitriyana [14] which shows that it is easier for students to understand the material using technology-minded learning so that students' self-efficacy becomes better.

Self-efficacy not only gives an idea of the ability they have but also provides an idea to deal with and solve existing problems [3; 51]. Referring to this statement, it is implied that a person's level of self-efficacy can determine his success in solving the problems at hand. This success arises because of the ability of the individual based on the knowledge that he has previously obtained. In an ongoing learning situation, the self-efficacy variable greatly affects the learning outcomes of each individual. The findings of this investigation align with the research undertaken by Rahdar [35] which confirms that students possessing high self-efficacy will give an effort that exceeds other levels of self-efficacy in solving problems. So, students with high levels of self-efficacy have higher learning outcomes than students with low levels of efficacy.

The results of this study are also relevant to the research conducted by Syarifah [45] which concludes that the self-efficacy variable with one's critical thinking ability has a positive influence. This is because self-efficacy has a role in providing one's critical thinking ability. Individuals who have self-efficacy tend to see various problems as a challenge that needs to be solved [3; 22]. A person's critical thinking ability will emerge if he has good literacy ability as

well. This literacy ability is needed by someone to explore various information as a provision to construct a solution by thinking deeply. The results of this self-efficacy study with literacy ability are in line with research from Cho [8] which shows that the activity of constructing a piece of information obtained to solve the problem, if it is not followed by good self-efficacy, then the projected solution cannot be conveyed properly.

Interaction between Station Rotation Learning Model and Self-Efficacy in Critical Thinking and Literacy Ability

The study results showed that there was no interaction between the learning model and self-efficacy in critical thinking and literacy ability. The learning model referred to in this result is the applied model or treatment given to students. The self-efficacy variable is a component that affects the ability of students to complete their learning. All the variables involved have no interaction with either the critical thinking or literacy ability variables. The results were as such because the independent variables and moderator variables did not have a direct relationship in influencing critical thinking and literacy ability as the dependent variables. When observed from the learning that was done, both students with high and low self-efficacy had an equal portion in carrying out learning. This statement was evidenced by the pattern of group distribution that was selected randomly or heterogeneously. In one group, there were not only students with a certain level of self-efficacy, but both levels of self-efficacy mixed together.

Focusing on learning in groups with heterogeneous members makes students more participative with each other to solve the prob-

lems given [1]. With this group division, students who have high self-efficacy indirectly help and encourage students who have low self-efficacy, facilitating seamless learning engagement. Group learning is expected to be able to encourage students to foster student engagement with peers, aligning the outcomes of this research with the learning theory proposed by Vygotsky, which states that group learning is directed as a cognitive apprenticeship to gain knowledge through interaction with more expert and more experienced colleagues [42].

Conclusion

This study revealed that there were differences in the results of students' critical thinking ($\text{sig}=0,000$) and literacy ability ($\text{sig}=0,000$) in the experimental and control groups. The next results that there were differences in the results of critical thinking ability ($\text{sig}=0,046$) and literacy ability ($\text{sig}=0,046$) in students who had low and high levels of self-efficacy because they were in group learning. Another finding was that there was no interaction between learning models with different levels of self-efficacy in critical thinking ($\text{sig}=0,659$) and literacy ($\text{sig}=0,262$) ability. The results of this study have implications especially for educators so as not to worry about the limitations of the learning model. Students can help each other according to each individual's learning style. The limitation of this study is that learning in both research groups utilizes technology (online) and uses only grade 5 primary school samples. Thus, the suggestion for further research is to combine the station rotation model with other learning media to design more effective online and offline learning with different sample variants.

Appendix 1

Self-Efficacy Instrument, English Version

Instructions

This observation sheet is used to understand the user's confidence in their ability to use information technology. Read each question carefully. Place a check mark (\checkmark) on the value that you feel most accurately reflects your feelings. The choice of values are as follows:

1 = Strongly Disagree

- 2 = Disagree
- 3 = Agree
- 4 = Strongly Agree

No	Question	Score			
		1	2	3	4
1	I can overcome many difficulties when using a computer				
2	I find it very easy to use a computer				
3	I am very unsure about my ability to use a computer				
4	I feel difficulties in using computer applications				
5	I am very interested in learning new applications on the computer				
6	I enjoy using a computer				
7	I do not encounter problems when running Windows applications on the computer				
8	Using a computer makes me happy to do tasks				
9	I am very confident in my ability to use a computer				
10	Learning to use a computer makes me think critically				
11	I have difficulties using the computer applications I want				
12	Sometimes I feel very confused using a computer				
13	I prefer to learn without using a computer				
14	For me, all the computer applications I have used are very difficult				
15	Sometimes I lack confidence using a computer near my friends				
16	When using a computer, I am afraid that a virus might attack my computer				
17	It seems I have difficulties when trying to use a computer				
18	Using a computer is very difficult for me				
19	Using a computer is an activity I rarely enjoy				
20	A computer is a great tool for learning				
21	I am very happy to complete tasks using a computer				
22	I feel incapable of using a computer				
23	I consider myself an expert in using a computer				
24	I am anxious that I might press the wrong button and damage the computer when using it				
25	I am confident I can use the menus and icons on the computer well				
26	I feel that learning ends too quickly when using a computer				
27	I am very confident I can complete tasks easily using a computer				
28	I prefer to ask others for help to complete tasks using a computer				
29	The menus and icons in the computer confuse me				
30	I cannot use a computer without the help of others				
Total Score					

Appendix 2

Reading Comprehension Literacy Skills Instrument, English Version

Instructions

Before you answer, make sure you understand what is being asked. Take your time to read text and each question and each possible answer. For each question, there is only one correct or most

appropriate answer. Even if more than one answer seems correct, choose the one that best answers the question.

Indicators	Questions	Answer Key
Literal	1. The character who feels back pain and aches is... a. Sinta b. Heru c. Judy d. Juna	B
Literal	2. The correct position of the elbow angle when sitting is to form an angle... a. 90 degrees b. 40 degrees c. 130 degrees d. 150 degrees	A
Literal	3. The part of the body that functions to maintain body stability is... a. Foot b. Hand c. Backbone d. Neck	C
Literal	4. The parts of Mr Heru's body that don't feel pain are... a. Back b. Shoulder c. Foot d. Neck	C
Reorganization	5. The following are the consequences of improper sitting, namely... a. Back pain b. The body becomes weak c. Body feels light d. Eyes become tired	A
Reorganization	6. Pay attention to the following things! A. The head position should be parallel to the body B. Elbows form an 80 degree angle C. Shoulders relaxed D. Knees should be at hip level E. Back straight without support F. Knees should be perpendicular which is the correct way to sit, namely... a. A, B, C b. A, F, D c. E, D, B d. A, C, D	D
Reorganization	7. The following are activities to do while sitting, namely... a. Playing soccer b. Working using a laptop c. Mountain climbing d. Hoe	B
Reorganization	8. Which of the following options describes an ergonomic sitting posture, based on the text? a. Head tilted forward, shoulders tense, and arms away from the body. b. Keep your head straight with your body, shoulders relaxed, arms at your sides, and elbows forming a 90 to 120 degree angle. c. Sit without leaning your back, with your thighs not parallel to the chair, and your knees higher than your hips.	B

	d. The back and shoulders are arched forward, with the head turned to the side when working	
Inferential Understanding	9. The activity that caused Mr Heru to feel back pain was... a. Very hard work b. Often spends his working time sitting c. Likes drinking water d. Exercise often	B
Inferential Understanding	10. The following are the wrong activities when sitting, namely... a. Use an ergonomic chair b. Twisting your back when picking up items c. Sit with your knees at hip level d. Stretch your body when you are tired	B
Inferential Understanding	11. In paragraph 7, what is meant by the word « This « is... a. Ergonomic chair selection b. Rotate the body in one unit c. Drink water d. Small walk	C
Inferential Understanding	12. What are the consequences of not drinking enough water in terms of back pain and soreness based on the story? a. Water helps maintain electrolyte balance which reduces the risk of back pain. b. Lack of hydration can cause muscles and bones to become dry, increasing the risk of pain. c. Water helps in reducing body weight which indirectly reduces the burden on the spine. d. Drinking enough water can reduce mental fatigue which is often associated with back pain	B
Evaluation Understanding	13. The correct sitting position can be useful for maintaining the health of our spine. Here are other activities that we can do to ease the work of the spine, namely... a. Take a small walk after sitting for a long time b. Drink at least 3 glasses of water per day c. Drinking fizzy drinks d. Use a hard backrest	A
Evaluation Understanding	14. According to the story, why does improper sitting posture cause pain and soreness? a. Because it causes too much movement while working. b. Because it causes the muscles to work harder and puts pressure on the spine. c. Because it causes mental fatigue which affects physical condition. d. Because it causes blood circulation to become less smooth	B
Evaluation Understanding	15. What important steps should a person take to avoid pain and soreness besides improving their sitting posture? a. Avoid drinking water while working to reduce the need to move. b. Sit all day without moving to maintain posture. c. Do regular exercise and maintain body hydration by drinking enough water. d. Use a pillow as back support when sitting	C
Evaluation Understanding	16. Why is it important to choose the right table and chair model for work? a. To add to the aesthetics and beauty of the work space. b. In order to accommodate more work equipment. c. To ensure comfort and support an ergonomic sitting posture. d. To make it easier to clean and maintain office furniture	C

Appreciation	17. Based on the reading « Correct and Healthy Sitting Posture », if you don't drink water as recommended then the possibility of what will happen is... a. Excessive thirst b. Tired c. Bones and muscles become dry d. Back pain	C
Appreciation	18. Things that must be done so that bones and muscles function optimally are... a. Drink 6 glasses of water per day b. Exercise every day c. Do muscle stretches d. Rotate the body in one unit	A
Appreciation	19. Based on the reading « Correct and Healthy Sitting Posture », the most appropriate activity for workers who often work in front of a laptop is... a. Adjust the correct sitting position b. Drink more c. Small walk d. Stand	A
Appreciation	20. What is the main message the author wants to convey through this story? a. The importance of regular exercise in daily life. b. Dangers of work involving heavy physical activity. c. The need to drink enough water for healthy bones and muscles. d. The importance of practicing an ergonomic sitting posture to prevent back pain and aches	D

Appendix 3

Critical Thinking Skills Instrument, English Version

Instructions

Before you answer, make sure you understand what is being asked. Read the question carefully and make sure you understand what is required. Then answer clearly!

Indicators	Questions	Answer Key
Basic Clarification	In your opinion, is it possible for us to feel back pain and soreness when receiving lessons in class? Explain your opinion!	Maybe. Because of our daily activities, we always sit for a long time in class. But if there is a group activity it may not hurt at all
Bases for a Decision	Based on the reading «Correct and Healthy Sitting Posture», is it possible that we can feel back pain and soreness when receiving lessons in class?	Maybe. Because our activities every day are always sitting for a long time. so our muscles work harder
Inference	Name 3 ways we can do so that we don't feel back and muscle pain!	Exercise every day. Don't sit for long periods of time Drink at least 6 glasses of water per day Do muscle stretches Adopt an ergonomic sitting posture
Advance Clarification	What can someone do if they have back pain? Explain your opinion!	Immediately stand up for a small walk Stretch

		Change the chair you are using to an ergonomic chair Go to the doctor
Auxiliary (additional) Abilities	With today’s technology, there are many activities that can be done just sitting. so it is very easy to do the job. However, this makes someone lazy to move. so that many people’s bodies feel sick and sore. What do you think about this?	With current technological advances, humans must continue to exercise and be active. A person may do work sitting, but not for long periods of time. Then it must be balanced by drinking 6 glasses of water per day

Critical Thinking Skill Assessment Rubric

Criteria	Score
Complete, correct answers, accompanied by examples and explanations of logical answers	4
The answer is correct and there is an explanation of the answer	3
Correct answer without explanation of the answer	2
Wrong answer and no reason, right answer and no reason	1
The answer is none	0

Appendix 4

Reading Text That has been Measured Using the SMOG Calculation, English Version

Correct and Healthy Sitting Posture

- Sinta was surprised by Mr. Heru, who often experienced back pain and aches, even though Mr. Heru never engaged in heavy labor. He usually worked while sitting down. (1)
- In the afternoon, Mr. Heru fell ill once more. (2)
- “Mrs. Sinta, my back frequently aches and hurts. When I sit in a chair, I feel uncomfortable. It’s not just my back, but also my shoulders and neck that often ache. Maybe my sitting posture isn’t correct, huh?» said Mr. Heru. This kind of pain is also common among many office staff. (3)
- Sitting improperly can lead your muscles to overexert themselves. Take, for example, the act of sitting. Working on a laptop with poor posture, or making calls by holding the cell phone between the ear and shoulder, can lead to discomfort. This is what likely caused the pain in Mr. Heru’s case. (4)
- The spine is a crucial part of the body that functions to maintain stability. Given that most of our activities involve sitting, it becomes essential to understand the correct sitting posture to protect our spine. (4)
- The correct sitting posture is one that is ergonomic. When sitting, your head should be aligned straight with your body. Your shoulders ought to be relaxed, with arms resting at your sides. Keep your elbows close to your body, bent at an angle between 90 to 120 degrees. Your back should be well-supported in an upright position. Ensure that your thighs and pelvis are perpendicular to the chair. Finally, your knees should be level with your hips. (5)
- Even with good sitting posture, it’s important not to sit for extended periods. We should make an effort to be active, taking frequent short walks. Engaging in exercise can also help in strengthening muscles and preventing them from becoming weak or stiff. (6)
- When reaching for something behind us, avoid twisting the back. Instead, rotate the entire body in one smooth motion. Additionally, the water in our body helps protect our bones, so it’s vital to stay hydrated. Drinking at least six glasses of water per day can prevent our muscles and bones from drying out, allowing them to remain fully functional. Another key factor is selecting the right model of table and chairs. By adhering to these guidelines, we can avoid pain and soreness even when sitting for prolonged periods. (7)

Calculating the readability level of text based on the SMOG formula (In Indonesian Version)
Number of Sentences: 34 Sentences
which has 3 syllables: 6 words (Standard score for class 5 = 3-6 words)

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