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Self-Directed Learning and Digital Literacy in Social Studies Learning: Efforts to Improve Students' Critical Thinking

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Annotation. This research aims to analyze the influence of self-directed learning (X1) and digital literacy (X2) on students' critical thinking (Y) in social studies learning. This quantitative research method uses structural equation modeling (SEM) data analysis assisted by the SMARTPLS 3.0 application program. The research results explain that self-directed learning and digital literacy positively and significantly affect students' critical thinking in social studies learning so that it is no longer boring.

Keywords: *critical thinking skills, digital literacy, self-directed learning, social studies learning.*

Introduction

Teachers must stay up to date with the latest developments in the field of education, which have been brought about by the digital era. The progress in technology has offered extensive possibilities to enhance learning through the utilization of digital resources (Jung, 2019). Digital learning is a learning approach that uses digital technology as the main means of transferring knowledge and skills to students (Hashim, 2018; Sanfelici & Bilotti, 2022). In the current digital era, technology has significantly

changed the way of learning and accessing information. Digital learning involves using digital devices such as computers, tablets, and smartphones, as well as internet access to access educational resources, interact with learning materials, and communicate with instructors or fellow students (Shutaleva et al., 2019; Williamson, 2016).

Digital learning in social studies education has changed the way students understand and deal with complex social, political, and economic issues (Handayani et al., 2024). Digital learning has provided ample opportunities to develop an in-depth understanding of social studies topics and broaden student involvement in the learning process (De Sousa et al., 2017; Kjällander, 2011). Learning social studies has an important role for students in developing critical thinking skills to understand the complexities of social, economic, political, and cultural issues that affect society (Ackland, 2015).

To strengthen students' critical thinking skills, two important factors need attention; namely self-directed learning, and digital literacy. Self-directed learning is a learning approach that encourages students to take initiative in organizing, managing, and evaluating their learning (Silamut & Petsangsri, 2020). This involves students' ability to manage time, select resources, and develop effective learning strategies (Hasal et al., 2023). Self-directed learning provides opportunities for students to develop critical thinking skills because they become active and responsible for their learning process (Choi et al., 2014). Students have control over learning goals, resources used, and monitoring and assessing their progress (Sanova et al., 2022a). In independent learning, students are taught to gather information, analyze data, formulate questions, and find solutions independently. This ability is very relevant in developing critical thinking, where students are expected to ask critical questions, analyze arguments, and draw conclusions based on evidence and logical thinking (Silamut & Sovajassatakul, 2021). Digital literacy in social studies learning is important according to the demands of the times in the current digital era. The term "digital literacy" refers to the ability of students to use information acquired using digital technology at both cognitive and affective levels. In practice, digital literacy allows students to acquire useful artefacts, develop data from various sources, evaluate reliability, and actively participate in a social study learning environment (Song et al., 2022).

In today's digital era, where information is readily available in abundance, digital literacy is an important skill for students to master in distinguishing valid and invalid information, evaluating reliable learning resources, and avoiding the dissemination of false or inaccurate information (Castellví et al., 2020). Digital literacy is the ability to use digital technology effectively and critically so that students' search processes can involve understanding how to search (Suyatna et al., 2018a), evaluate, and use information found through digital technology (Önger & Çetin, 2018; Warschauer, 2009).

The combination of self-directed learning and digital literacy can undoubtedly enhance students' critical thinking abilities. Through self-directed learning, students gain autonomy in sourcing and evaluating pertinent information to support their

critical thinking skills (Jin & Ji, 2021; Kang et al., 2020). Concurrently, digital literacy equips students with the skills to assess the credibility of sources, discern biases, and distinguish between strong and weak arguments (Mangkhang & Kaewpanya, 2021; Taşkıran & Salur, 2021).

Previous research (Hendricson et al., 2006; Irhandayaningsih, 2022; Karatas & Arpaci, 2021; Wasyilah et al., 2021) explained that self-directed learning and digital literacy can affect students' critical thinking. Amid rapid technological advances, self-directed learning and digital literacy emerge as determinant factors for honing students' critical thinking skills in the digital era. The determinant factors in question combine to develop students' thinking patterns to become sharper and more analytical. Self-directed learning and digital literacy can influence students' critical thinking abilities; this can happen because, with self-directed learning, students can have the awareness to learn and take full responsibility for themselves (Indah et al., 2022; Kong, 2014). Digital literacy allows students to obtain important information with the help of technology or the internet, which makes it possible to acquire broader and more up-to-date knowledge.

Self-directed learning and digital literacy require efforts to be synergized by educators, specifically in social studies learning in Indonesia, to improve critical thinking skills. However, many teachers still need to focus on self-directed learning and digital literacy as social studies learning objectives; most teachers are still focused on using textbooks only. The current digital era requires innovation and creativity in using learning resources that utilize advanced technology, so students are more active. To increase students' access to insight and knowledge in the form of a dynamic learning experience, it is necessary to implement digitalization in educational media. Therefore, efforts to find the best solution to improve the quality of primary education are urgently needed by opening the horizons of digital media in learning.

The purpose of this study is to examine how students' critical thinking abilities are enhanced when they learn social studies through self-directed learning and digital literacy. This goal is fundamental so that students are highly aware of the need for self-directed learning, supported by digital literacy, so they must be motivated, interested in education, and responsible for in learning social studies. Students with good self-directed learning and digital literacy abilities will stand out and excel, which means they can improve their critical, creative, innovative thinking and self-confidence and be responsive to various existing social problems. Hypothesis testing in this research was carried out within the inner model framework. Thus, the hypotheses in this research are as follows:

1. Self-directed learning has a positive and significant effect on students' critical thinking.
2. Self-directed learning has a good and meaningful effect on students' digital literacy skills.

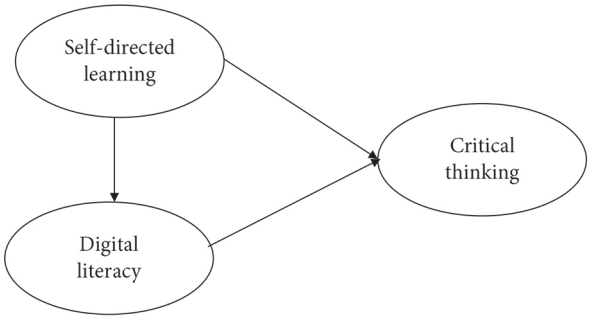
3. Students' high digital literacy skills can positively and significantly affect students' critical thinking.
4. Self-directed learning and digital literacy jointly influence students' critical thinking.

Methods

Research Design

This study employs quantitative methods with an ex post facto design to examine variables that can forecast outcomes using structural equation models (SEM) (Al-Emran et al., 2019; Balnaves & Caputi, 2018; Stockemer, 2019). The underlying framework for this study is based on the integration of self-directed learning (X1) and digital literacy (X2), both of which will have an impact on students' development of critical thinking skills (Y). The variables self-directed learning (X1) and digital literacy (X2) form a vital foundation for forming students' critical thinking (Y) in the context of social studies learning. This provides a concept that allows individuals to actively participate in the social studies learning process so that it helps to solve students' learning problems so far, with digital literacy students can utilize digital platforms for independent learning. The following is a research path model.

Figure 1
Research Model Framework



Note. Self-directed learning = (X1), Digital literacy = (X2), and Critical thinking = (Y)

Population and Sampling

The population participation in this study was elementary school students in Lampung, Indonesia. The sample was selected through a survey method which involved the use of a questionnaire to collect information from respondents who were selected on a representative basis. The details are: 30.54% are male (f = 69) and 69.46% are female

(f = 194), students from class IV are 32.41% (f = 75), class V 34 .87% (f = 98), and class VI, namely 32.72% (f = 89). Further explanation can be seen in the following Table 1.

Table 1
Total of Students Participating

Class	Pretest	Treatment	N
	Male	Female	
Class IV	20	55	75
Class V	25	73	98
Class VI	23	66	89
Total	68	194	262

Note. N = 262

Collection of Research Instruments

The collection of research data includes self-directed learning, digital literacy, and critical thinking using a Likert scale questionnaire instrument. The development of the questionnaire was guided by previous research (Aktoprak & Hursen, 2022; Gainer, 2012; Loeng, 2020), which consisted of self-directed learning questionnaires, digital literacy, and critical thinking. The self-directed learning, digital literacy, and critical thinking instrument consist of 18 statement questions easily understood by elementary school children in grades IV, V, and VI. The instrument used for each variable has a statement that has been adjusted to the level of understanding of elementary school students. It is hoped that they will be able to answer more precisely and accurately than each statement made. While the signs of students' critical thinking are the importance of clarifying material, giving reasons for conclusions, inferring, and conjecturing and integration. The instruments in this study all used a Likert scale with five alternative answers (strongly agree = 5, agree = 4, somewhat agree = 3, disagree = 2, strongly disagree = 1).

Data Analysis

Data analysis in this study employed Partial Least Squares (PLS) analysis of the structural equation model (SEM) to assess the impact of the construct variables, including both exogenous and endogenous variables, while accounting for measurement errors (Wong, 2019). Data analysis was assisted by the SMARTPLS 3.0 software program which was also used to test the research hypothesis. PLS-SEM is a model for analyzing the relationship between variables that considers latent variables (constructs) and their indicators. PLS-SEM obtains path parameter estimates that maximize the endogenous variance explained by the exogenous variance through a structural model. The primary objective of the outer model, or the measurement model, in PLS-SEM analysis is to gauge constructs (latent variables) through measurable indicators. This

phase assesses the validity and reliability of the questionnaire indicators utilized in this study, ensuring that the constructs are adequately measured (Lin et al., 2020).

This research uses the bootstrapping algorithm as part of the partial least squares method for PLS-SEM estimation. The normality test assumption is not important when bootstrapping is used. By using repeated sampling, the non-parametric bootstrapping technique obtains a sample distribution from the original data. Thus, the original distribution of the data does not need to adhere to the assumption of normality to exploit the power of the bootstrapping method (Lin et al., 2020).

When examining the outer model, the criteria encompass a loading factor parameter exceeding 0.7 and an average variance extracted (AVE) value surpassing 0.5. These criteria specifically evaluate the loading factor parameter and AVE as pivotal factors within this category (Mueller & Hancock, 2018). Meanwhile, in hypothesis testing, the category used is the p-value. If the p-value is less than 0.05, the hypothesis is accepted, whereas if the p-value is more than 0.05, the hypothesis is rejected (Teo et al., 2013).

Results

Test Results of the Validity and Reliability of the Path Model

The objective of conducting validity and reliability tests on the questionnaire for each variable is to ensure the dependability and validity of the research data. The outcomes of the analysis, as determined by the model's calculations, have satisfied the validity criteria (both convergent and discriminant) and have also met the reliability standards. PLS-SEM is employed to analyze the results of the validity and reliability tests of questionnaires administered to high school students, focusing on the quality of self-directed learning, digital literacy, and critical thinking (outer model). The factor loading value of this study used confirmatory factor analysis (CFA) which was taken from the acquisition of Cronbach's alpha, CR, and AVE values according to needs as well as the outer model loading value for each factor in the latent variable of more than 0.7 (Teo et al., 2013). The results of the validity and reliability tests can be seen in the following Table 2.

Table 2
Results of the Analysis of the Validity and Reliability

Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Self-directed learning (X1)	0.858	0.906	0.708
Digital Literacy (X2)	0.831	0.899	0.747
Critical Thinking (Y)	0.776	0.869	0.789

Source: developed by author (2023).

The output results of the outer model, depicted in Figure 2, have been utilized to analyze the validity and reliability values of the survey pertaining to self-directed learning, digital literacy, and critical thinking. The analysis reveals that all variables examined in this study demonstrate validity values ranging from .718 to .918 and reliability values ranging from .708 to .906. The validity testing for each indicator within every variable has yielded a factor loading value exceeding 0.7, indicating its ability to elucidate the latent variables under investigation. Additionally, the reliability testing has produced an Average Variance Extracted (AVE) value surpassing 0.5 for each variable, affirming their reliability. Consequently, the questionnaire employed in this study is deemed accurate and proficient in gauging students' perceptions of self-directed learning, digital literacy, and critical thinking, thereby facilitating hypothesis testing.

Figure 2
Path Diagram of Validity and Reliability Test Results

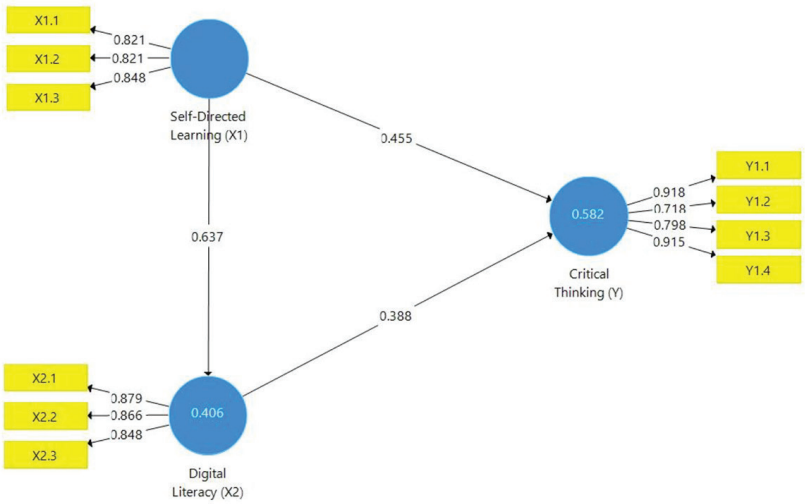


Figure 1 shows the analysis results, which show that this research's validity and reliability tests are considered good. Each variable indicator shows high validity and reliability, with a value above 0.7. This threshold value indicates that the variable construction used in the research has been proven consistent and reliable, making it possible to proceed to the hypothesis stage.

The results of research hypothesis testing through SEM analysis

This study uses the path coefficient test to analyze the hypothesis. However, before the hypothesis testing stage, it is necessary to analyze the fit model of the research data using the goodness of fit test. The results of the normed fit index (NFI) and standardized root mean square residual (SRMR) values are used as a category to determinate

whether the model is fit or not. Testing the fit of this model was carried out using the SMARTPLS-SEM program. The model is suitable if the NFI score exceeds 0.8 and the SRMR below 0.10 (Mueller & Hancock, 2018). The results of the fit model of this study indicate that the acquisition of the NFI value is 0.913 and the SRMR value is 0.082 so the model of the research variables is declared fit. Analysis of research hypothesis data was carried out through the bootstrapping test method on SMARTPLS 3.0. The method aims to test theories and estimates of population parameters based on existing samples and test the significance value of each selected hypothesis. The results of hypothesis analysis using the bootstrapping test method can be seen in the following table 3.

Table 3

Results of Hypothesis Analysis Through SEM

Variable	Original Sample (O)	T-Statistics	P-Values
Self-directed learning (X1) -> Critical Thinking (Y)	0.702	7.901	0.000
Self-directed learning (X1) -> Digital Literacy (X2)	0.388	17.638	0.000
Digital Literacy (X2) -> Critical Thinking (Y)	0.637	26.830	0.000
Self-directed learning (X1) -> Digital Literacy (X2) -> Critical Thinking (Y)	0.247	6.671	0.000
Self-directed learning (X1) -> Digital Literacy (X2) -> Critical Thinking (Y)	0.455	6.433	0.000

Source: developed by author (2023).

The output results of Table 3 explain that the direct effect of this research hypothesis is 1) The magnitude of the parameter coefficient for self-directed learning (X1) on critical thinking (Y) is 0.702 while the P-Value is 0.000 <0.05 which means that self-directed learning (X1) has a positive effect on critical thinking (Y) of 70.2%. 2) The parameter coefficient value for self-directed learning (X1) on digital literacy (X2) is 0.388, while the P-Value is 0.000 <0.05 which means it has a positive effect on digital literacy (X2) of 38.8%. 3) The magnitude of the parameter coefficient for digital literacy (X2) on critical thinking (Y) is 0.637 while the P-Value is 0.000 <0.05 which means digital literacy (X2) has a positive effect on critical thinking (Y) of 63.7 %.

The indirect effect of research is seen from the total indirect effect hitch explains that the acquisition of the parameter coefficient values of all variables is equal to 0.247 and the acquisition of P-Values is 0.000 <0.05, which means that the higher the values of X1 and X2, then the value of Y will increase as well. only 24.7%. The overall direct effect of this research is assessed through the total effect, which reveals the R-Square coefficient values. Specifically, the R-Square coefficient value from self-directed learning (X1) to critical thinking (Y) is 0.579, while the R-Square coefficient value from digital literacy (X2) to critical thinking (Y) is 0.405. In addition, the R-Square coefficient for

both self-directed learning (X1) and digital literacy (X2) on critical thinking (Y) is 0.455, with a corresponding p-value of 0.000, indicating a simultaneous positive and significant effect. While the acquisition of the R-Square coefficient value of self-directed learning (X1) and digital literacy (X2) on critical thinking (Y) is 0.455 and the p-value is 0.000 <0.05, which means that together self-directed learning (X1) and digital literacy (X2) have a positive and significant effect on critical thinking (Y) with an increase of 45.5%, so the research hypothesis H_a is accepted. The summarized results of the outer loading analysis are depicted in the following path figure.

Figure 3
Significant Path Coefficient Results of Hypothesis Testing

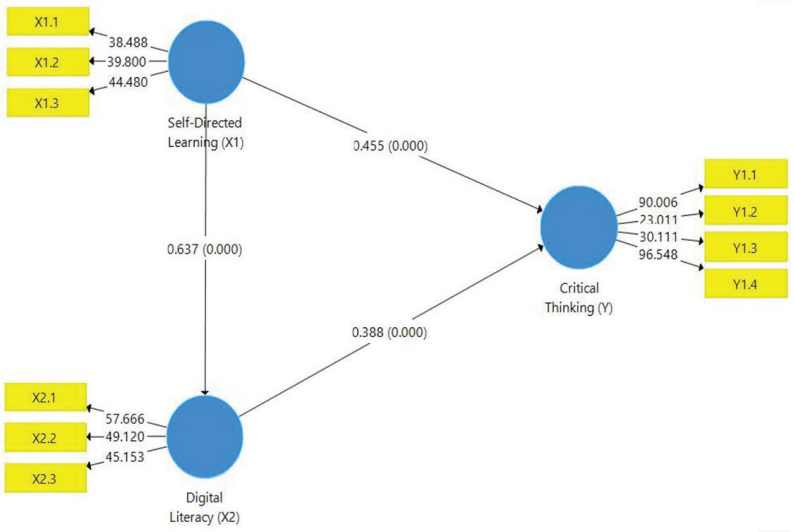


Figure 3 explains that the P-value score in this research is 0.000 <0.05, which means that self-directed learning and digital literacy positively and significantly influence students' critical thinking skills in social studies learning. Structural Equation Modeling (SEM) used in this research aims to understand the complexity of the influence between the variables studied which provides a more comprehensive framework for explaining the influence of self-directed learning and digital literacy on students' critical thinking.

Discussion

Education in the digital era is no longer limited to traditional teaching methods, teachers only act as a single source of knowledge. Student-centered learning models

are increasingly being applied, and this emphasizes the importance of self-directed learning and digital literacy in the development of students' critical thinking skills (Kurniawan et al., 2023; Lim & Kamin, 2023). Self-directed learning and digital literacy in social studies learning are very important to implement because these two aspects can allow students to take an active role in learning, develop critical skills, and utilize digital resources to access relevant information (Mangkhang & Kaewpanya, 2021; Ninghardjanti & Dirgatama, 2021; Warschauer, 2009). Previous research (Hariyati & Tarma, 2018; Haryanto et al., 2022; Kümmel et al., 2020; Li et al., 2023; Shinkareva & Benson, 2007; Toh & Kirschner, 2020) explained that self-directed learning and digital literacy have an attraction for students to practice critical levels and analysis because with this student will be invited to be more active and involved in the learning process so that teachers will focus more on guiding and becoming facilitators so that students able to improve their skills.

The impact of self-directed learning on critical thinking is evident in students' capacity to proactively initiate, organize, and regulate their learning journey. Through self-directed learning, students are motivated to delve deeper into subjects of personal interest, thereby fostering the development of critical thinking skills (Karakas & Manisaligil, 2012). Factors that influence self-directed learning in social studies learning to improve students' critical thinking can be analyzed from several abilities possessed by students including: a) Increase independence: through self-directed learning the learning process is livelier because it encourages students to be responsible for their own learning. Independent students have better critical thinking skills because they do not depend on the limited information presented. b) Develop problem-solving skills: self-directed learning engages students in identifying problems, formulating questions, and finding effective solutions. In this process, students are invited to think critically, analyze relevant information, evaluate various options, and make informed decisions. c) Encouraging reflection: self-directed learning encourages students to reflect on their understanding of the topics studied (Barat Dastjerdi & Ahmed, 2019; Estell, 2019; Li et al., 2023; Timothy et al., 2010). Students can build a more critical and complete viewpoint by reflecting on their information and experiences, questioning current assumptions, identifying gaps in their understanding, and challenging them. This reflection allows students to increase the quality of their critical thinking.

Previous research (Handayani et al., 2024) has shown that self-directed learning and digital literacy significantly positively affect students' ability to think critically. These results indicate that these two components are very important to implement in social studies learning practices because both have been proven to contribute significantly to students' cognitive development and critical thinking (Fadli & Kissiya, 2024). According to previous research (Yanti & Susilo, 2023) on self-directed learning, allowing students to take control of their learning is critical. Because it can make students take conscious initiative and responsibility in independent learning, students who can

study independently can increase their academic and non-academic intelligence by carefully exploring learning sources and skill development sources on the internet, which are not only limited to e-books but also come from interactive video sources, learning games, online quizzes, and others. This research position focuses on aspects of psychological responsibility in learning and student interest or motivation.

Digital literacy is an essential need for educators as a form of relevance in the learning process trending with digitalization so that it can be used as an effective and efficient medium. Apart from that, in digital literacy, there are various important aspects, namely digital reading and writing skills, the ability to assess the credibility of online information sources, and the ability to be creative in using various digital media for learning. The explanation from previous research provides the conclusion of this research: The two factors of self-directed learning and digital literacy, individually, have an important role in improving students' critical thinking abilities in social studies learning. Self-directed learning helps students develop independence, self-reflection, and problem-solving abilities. At the same time, digital literacy provides access to diverse sources of information and helps students critically evaluate and organize that information.

Self-directed learning in the digital era is a phenomenon that needs to be developed by teachers so that students are more conscious of their learning. Self-directed learning, combined with digital literacy, can present students with new experiences to explore (Feola, 2016). Digital literacy has a significant impact on students' critical thinking skills, which may be measured by utilizing information and communication technologies to effectively search for, evaluate, and use information critically and analytically (Alshaye, 2021; Evin Gencel & Saracaloğlu, 2018). Digital literacy skills have had a positive and significant influence on students' critical thinking which occurs because it is seen from several factors, namely first, gaining access to information sources in learning, where students can update the latest information by visiting certain websites to support their learning activities. Second, regarding ethics/evaluation when obtaining information, students will use digital literacy to be involved in the authenticity, credibility, and validity of information received online. Digital literacy teaches students to question a lot of information, examine data, and identify standard information to obtain reliable information to develop their critical thinking skills. Third, collaboration and sharing: Digital literacy invites students to collaborate and share with peers in social studies lessons via online platforms (Hauck, 2019; Kaeophanuek et al., 2019; Pötzsch, 2019; Suyatna et al., 2018b; Turan & Koç, 2018; Wayan Widana, 2020). This collaboration gives rise to discussion activities, sharing ideas and other points of view for students to broaden their horizons and think more critically.

Self-directed learning and digital literacy skills have a significant and substantial effect on improving students' critical thinking in social studies learning. Both aspects are important mediators in improving students' critical thinking. Students' awareness

of the need for digital literacy is supported by high self-directed learning abilities. A student with self-directed learning abilities and digital literacy tends to have superior motivation and responsibility for his learning abilities. Now many schools in Indonesia are working on a digital literacy culture movement to adapt to current developments in the education process. Students can actively participate due to self-directed learning and digital literacy applied by the teacher, thus making students much more interested and meaningful because they can explore many materials and discussions (OpenAI, 2024). The concept aligns with social studies learning, which makes human life the subject of study. Human life is dynamic, which never stops, but is always active and requires renewal in every learning process. The concept attempts to support students in quickly accessing information and knowledge to make the social studies learning process more effective and meaningful.

Conclusions

The results of this research provide a positive response to previous research that self-directed learning and digital literacy in social science learning can positively and significantly affect students' critical thinking. This can be seen in the learning process. When students use self-directed learning, they feel freer, helping develop their potential. Digital literacy in schools must be carried out through digital models or platforms to be accessed digitally/online. Digital platforms in the learning process are critical because they can make it easier for teachers to develop students' abilities to search for information, understand information, and improve students' critical thinking. For this, it is a positive thing and progress in innovation means that getting used to digital platforms can make learning more accessible for students. Developing critical thinking skills is crucial for students to instill an intelligent and competent national character. Social science learning is a forum for integrating the principles of self-directed learning and digital literacy, which are relevant for teachers and schools and can instill awareness and responsibility in students toward a meaningful learning process.

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Į save nukreiptas mokymasis ir skaitmeninis raštingumas mokantis socialinių mokslų dalykų: pastangos lavinti mokinių kritinį mąstymą

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Santrauka

Šio tyrimo tikslas – taikant kiekybinį metodą, išanalizuoti į save nukreipto mokymosi ir skaitmeninio raštingumo įtaką mokinių mąstymui mokantis socialinių mokslų dalykų. Tyrime dalyvavo 262 pradinių klasių mokiniai iš Lampungo (Indonezija) pradinės mokyklos. Duomenims rinkti naudotas apklausos instrumentas – klausimynas, kurio klausimai apima savivaldų mokymąsi (X1), skaitmeninį raštingumą (X2) ir kritinį mąstymą (Y). Šiame tyrime atlikta struktūrinių lygčių modelio (SEM) duomenų analizė naudojant SMARTPLS 3.0 taikomąją programą. Tyrimo rezultatai atskleidžia, kad į save nukreiptas mokymasis ir skaitmeninis raštingumas gali turėti teigiamą ir reikšmingą poveikį mokinių kritiniam mąstymui mokantis socialinių mokslų dalykų, nes dėl šių lemiamų veiksnių socialinių mokslų dalykų mokymosi procesas tampa nebe nuobodus, o gerokai aktyvesnis. Šių dviejų veiksnių integracija užtikrina stiprią sinergiją tobulinant mokinių kritinio mąstymo įgūdžius, kurie leidžia mokiniams savarankiškai tyrinėti informaciją, spręsti problemas ir ugdyti reflektyvų mąstymą, taip užtikrinant pasirengimą spręsti sudėtingus iššūkius ateityje.

Esminiai žodžiai: *kritinio mąstymo įgūdžiai, skaitmeninis raštingumas, į save nukreiptas mokymasis, socialinių mokslų dalykų mokymasis.*

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