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THE EFFECT OF DIGITAL CLASS LEARNING MODELS ON DIGITAL LITERACY AND HIGH-ORDER THINKING SKILL IN ELEMENTARY SCHOOL STUDENTS

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Abstract

An ethnic-social-based digital classroom learning model has been designed to address the need for learning innovations for elementary school students in line with its development of the 4.0 age. This model was also created in response to the low levels of digital literacy and HOT proficiency among primary school kids. So, it was crucial to understand how its implementation affected these pupils. This study aimed to ascertain how the ethnic-social-based digital classroom learning model affected primary school students' digital literacy and HOT skills. This study employed a post-test-only control design in a quasi-experimental context. 300 primary school kids in grade V made up the research sample. The HOT measurement contained six questions, whereas a questionnaire with 40 statements was used to assess digital literacy skills. The MANOVA test was employed in the data analysis method. According to the study's findings, elementary school kids' digital literacy abilities and HOTS were impacted by the ethnic-social-based digital classroom learning model. When compared to other approaches, the digital class learning model was more effective at enhancing students' HOT and digital literacy skills

Keywords: Learning Models, Digital Classes, Digital Literacy, HOTS

INTRODUCTION

The 4.0 era's development includes the advancement of technology and information (Dilberoglu et al., 2017; Adedoyin et al., 2020). The employment of technology and information systems is integral to Era 4.0. This is because technology is used in every element of human life to improve the flow of life. Human thinking and behavior have been significantly impacted by the emergence of the 4.0 era (Li, Dai, & Cui, 2020). In this era, people tend to think and act in ways that encourage the creation and use of technology. This affects education as well. Technology and information systems must be used in the educational realm, especially throughout the learning process (Miranda et al., 2021). To accomplish learning objectives in the 4.0 era, technology is the primary enabling factor (Kenedi et al., 2019). Students in the "4.0" era tend to enjoy using technology (Pabbajah et al., 2020). Teachers must therefore be able to create technology-based learning that may be applied as a strategy to raise the standard of learning, including elementary school learning.

Learning in primary schools is distinct from learning at other levels. Elementary school learning needs to be modified for each student's developmental stage (Kenedi et al., 2019). The learning method must be relevant to elementary school children's development and concrete

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(Hamimah et al., 2019). Because children between the ages of 6 and 13 are those who are in the concrete operational time, this applies to students in this age range. Therefore, primary school teachers must be able to create lessons that are appropriate for the pupils' developmental stage. In addition, teachers must study the advancement of technology and information systems. Utilization of technology and information systems has increased recently, particularly in response to the Covid-19 outbreak (Ibrahim et al., 2021; He, Zhang, & Li, 2021). Elementary school teachers and students were compelled to employ technology for distance learning during the Covid-19 outbreak in the world (Xie, Siau, & Nah, 2020). In primary schools, the teacher's impromptu use of technology for learning is very beneficial for carrying out the learning process, although many learning goals are not achieved in terms of quality. This situation is understandable given that many teachers are still unused to using this technology. However, it is clear from this instance that teachers are already capable of using technology in times of emergency. This situation serves as the basis for creating models of digital based-learning. Researchers have created a digital classroom learning model in earlier experiments. Both professors and students can use this online learning process. Virtual lessons that are generated anywhere and at any time allow for direct interaction between teachers and students. Teachers can add exercises, assignments, and learning resources to help students learn more effectively. On the one hand, through the offered classes, students can access educational resources and communicate with teachers. This digital classroom learning model combines ethnic-social learning. Learning that incorporates the social behavior of society into the learning process is referred to as ethnic-social learning. Many social values that can be utilized as learning resources led to the selection of ethnic-social learning. This is in line with the elementary school learning philosophy, which calls for contextual learning (Zulfiati, Praheto, & Sudirman, 2021). Researchers have created an ethnic-social-based digital classroom learning model. Five learning experts have validated this strategy as viable and practicable for implementation in elementary classrooms.

An ethnic-social-based digital classroom learning model aims to help primary school pupils enhance their digital literacy and higher-order thinking skills. One of the skills that students need to possess in the 4.0 era is digital literacy (Abdulai et al., 2021). The capacity to find, comprehend, and effectively use information from digital sources is known as digital literacy (Breakstone et al., 2018). The capacity to manage the variety of information found in digital media is beneficial for kids to have (Sun, Loh, & Nie, 2021). Digital literacy abilities relate to the comprehension and creation of knowledge and the usage of technology and information (Vélez & Zuazua, 2017). Four indicators of digital literacy skills include the ability to use the internet, the ability to understand navigation in a web browser, the ability to analyze what is found in a web browser, and the ability to collect information and evaluate that information. These demonstrate the need for students to acquire digital literacy skills in the 4.0 era. So that they can use technology effectively to further their academic objectives. However, it was discovered that the average digital literacy capacity of elementary school pupils was 55.67, with a poor category after the initial questionnaire was distributed to 100 kids in Indonesian elementary schools. This demonstrates the need for further development of primary school kids' digital literacy skills. To prepare primary school pupils for the learning process in the 4.0

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era, it is crucial to address this finding. Higher-order thinking skills are one of the abilities that primary school pupils need to learn in addition to digital literacy skills. HOTS refers to a student's capacity for analysis, evaluation, and creation (Tambunan, 2019). The HOTS demands a sophisticated thinking process (Heong et al., 2011). In the 4.0 era, when students are presented with complex problems that demand thinking processes to solve, HOTS is a crucial component of the abilities that they must learn. Students must not only understand the issue at hand but also be able to come up with alternate answers and communicate them well so that they can be used to solve other issues. Therefore, HOTS must be created from a young age, including for students in elementary school. However, based on the initial HOTS evaluation of 100 primary school kids, it was discovered that students received an average score of 55.84. This score demonstrates that pupils' HOTS is still low. Consequently, there is a need for initiatives to do so. Given that it is clear from this explanation that elementary school pupils still have low levels of digital literacy and HOTS proficiency, it is significant to create an ethnic-socially oriented digital classroom learning model to raise these levels.

The researchers' analysis of the literature led them to the conclusion that no studies had discovered the effects of ethnic-social-based digital class models on digital literacy abilities and higher-order thinking abilities. According to a recent study by Purnama et al. (2021), elementary school kids might lessen the harmful consequences of the digital learning process by developing their digital skills. According to these findings, primary school pupils truly need to grasp digital literacy if they want to lessen their chance of obtaining information that is inappropriate for them to consume. The research conducted by Purnama et al., which examined the impact of the ethnic-social-based digital classroom learning model built on students' digital literacy abilities and HOTS, is distinct from the researcher's research. Therefore, the goal of this study was to compare the effects of the developed ethnic-social-based digital classroom learning model to the conventional learning model that was widely adopted and the conventional digital classroom learning model that was introduced during the pandemic on elementary school students' digital literacy and HOTS skills.

The 4.0 era demands technology-based learning in elementary schools, so it is crucial to conduct this research. To implement technology-based learning in primary schools, it is necessary to understand the implications of this research. In addition to helping enhance primary school pupils' high-level thinking abilities and digital literacy skills

LITERATURE REVIEW

Ethnic-Social-Based Digital Classroom Learning Model

The digital class learning paradigm is an online learning model. Online interaction between teachers and students is made easier by this model. The digital class learning model is an example of a learning innovation that is in line with the 4.0 era since it is in line with information systems and technical advancements. The digital classroom learning approach offers several benefits, including being more adaptable, communicative, and responsive. Having an internet connection allows teachers and students to communicate at any time and from anywhere. Because it involves using technology, the digital class learning approach

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makes learning enjoyable for the pupils. In primary schools, the digital classroom learning process is seen as a new transformation for learning that can enhance learning quality because the technology for pupils is a new type of enjoyment. Therefore, it can be said that the digital classroom learning model is a novel development for primary school kids that can raise the standard of learning.

A digital classroom learning model with an ethnic-social basis was used in this study. The social traditions of local communities are used as the basis for learning issues in this ethnic-social-based digital classroom learning model. In digital courses, the social interactions in the communities near the students are utilized as learning resources. Due to the various values that may be learned from how people behave in social situations, ethnic-social was selected as the fundamental basis. As a result, it was indicated in earlier studies that experts had approved the use of ethnic-social-based digital classrooms.

Digital Literacy Skill

Technological advancements came forth as the 4.0 era developed. Technology itself is significantly impacted by this development in technology. Students in elementary school need to have a basic understanding of digital literacy because technological advancement is not only tied to hardware but also software (Perdana et al., 2019). The capacity to find, analyze, and use many digital resources is directly proportional to one's level of digital literacy. Protecting kids from the harmful effects of digital media and enabling them to improve their critical thinking abilities about it are the goals of the development of digital literacy skills. There are four digital literacy ability (Porat, Blau, & Barak, 2018; Hasanah, Dewi, & Ratnaningsih, 2020):

- **Internet searching**

  Internet searching is the ability to find information through search engines.

- **Hypertextual Navigation**

  Hypertextual Navigation is the ability to read and understand hypertext.

- **Content Evaluation**

  Content Evaluation is the ability to think and evaluate what is found on the web. Then be able to identify the completeness of the information contained in the hypertext link.

- **Knowledge Assembly**

  Knowledge Assembly is the ability to gather information from various sources, then evaluate the facts and opinions from that information.

These four indicators will be used as a reference in measuring the digital literacy ability of elementary school students.

High-Order Thinking Skill

Thinking is a mental activity that arises when someone encounters a challenge that needs to be overcome (Heong et al., 2012). Low-order thinking skills (LOTS) and high-order thinking

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skills (HOTS) are the categories that make up this thinking exercise. Problem-solving techniques, bloom taxonomies, and learning, teaching, and assessment taxonomies are examples of cognitive concepts and learning taxonomies that have been used to construct HOTS (Ramadhan et al., 2019). A technique for finding new challenges is called HOTS (Tanujaya, Mumu, & Margono, 2017). A person can be forced by HOTS to use recent or old information and manipulate it to come up with solutions to fresh problems. Students with HOTS can differentiate between opinions and facts, locate relevant information, work through issues, analyze issues, and draw conclusions from issues (Kwangmuang et al., 2021). According to Blomm and Anderson, HOTS is divided into three parts: analyzing, evaluating, and creating. Analyzing is the process of breaking up information into manageable pieces and comprehending how these pieces interact with one another. This analysis task entails differentiating, organizing, and attributing. Evaluating is the capacity to consider assessing information in line with established standards and criteria. Checking and criticizing are part of this action. Creating, often known as being able to develop an original product, is the process of thinking through how to combine parts to create something new. This activity's process comprises generating, planning, and producing (Anderson, 1994). Based on these three HOTS indicators, primary school kids' HOTS will be evaluated

RESEARCH METHODOLOGY

This study employs a posttest-only control design in a quasi-experimental context. The conventional learning models, conventional digital classroom learning models, and ethnic-social-based digital classroom learning models are the independent variables. Digital literacy and HOT skills are the dependent variables. Students in the fifth grade from the Aceh province made up the study's population. There were 300 students in class V of the elementary school, as determined by random sampling. Using a 40-question survey to assess digital literacy skills and a 6-question test to assess HOTS proficiency. Experts performed internal validation on each instrument before measuring it and approving it for usage. All questions were deemed legitimate and received a reliability score of 0.92 in the high category. Control was also performed by conducting external validation through trials. Using SPPS for Windows, the stages of preliminary testing, hypothesis testing, and additional testing were performed on data analysis methodologies. The One-Sample Kolmogorov-Smirnov Test and the Levene Test are two preliminary tests for normality and homogeneity, respectively. MANOVA was employed for the hypothesis test, while Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root were utilized for additional testing.

The research hypothesis is

H0: There is no effect of the three learning models (conventional learning models, conventional digital classroom learning models, and ethnic-social based digital classroom learning models) on digital literacy skills and higher order thinking skills

H1: There is effect of the three learning models (conventional learning models, conventional digital classroom learning models, and ethnic-social based digital classroom learning models) on digital literacy skills and higher order thinking skills

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RESULTS AND DISCUSSION

Results

The tabulation of measurement results data is as follows:

Table 1: Tabulation of Research Data

Descriptive Statistics				
	Learning_Model	**Mean**	**Std. Deviation**	**N**
Digital_Literacy	Conventional Learning	54.6700	6.05539	100
	Digital Class Conventional	79.5900	2.61163	100
	Digital Class Based Etno-Social	93.2600	1.88076	100
	Total	75.8400	16.48191	300
HOTS	Conventional Learning	55.8400	2.97369	100
	Digital Class Conventional	73.9900	3.01342	100
	Digital Class Based Etno-Social	92.9900	2.65336	100
	Total	74.2733	15.46272	300

Table 1 provided information about the value of HOTS and digital literacy skills. An ethnic-social-based digital classroom learning model had the greatest average score for digital literacy skills, 93.26, and the lowest standard deviation, 1.880. The standard deviation indicated that the values in the ethnic-social-based digital classroom learning model were distributed equally since the approach used to calculate it was suitable for obtaining a low standard deviation. In contrast, the ethnic-social-based digital classroom learning model received the highest average HOTS score of 92.99 with the lowest standard deviation of 2.653.

The initial measurement was done by conducting a normality test. The ability of digital literacy and HOTS utilizing the Kolmogorov-Smirnov Test were the dependent variables for the normality test. The following table showed the outcomes of the Univariate Normality Test.

Table 2: Data Normality Test

One-Sample Kolmogorov-Smirnov Test			
		Digital_Literacy	**HOTS**
N		300	300
Normal Parameters[a,b]	Mean	75.8400	74.2733
	Std. Deviation	16.48191	15.46272
Most Extreme Differences	Absolute	.219	.179
	Positive	.147	.171
	Negative	-.219	-.179
Test Statistic		.219	.179
Asymp. Sig. (2-tailed)		.916[c]	.462[c]
a. Test distribution is Normal.			
b. Calculated from data.			
c. Lilliefors Significance Correction.			

Table 2 showed that each dependent variable's fulfilment of the univariate normality assumption is determined by the HOTS abilities and digital literacy. By comparing the significant values, it was possible to determine if the normality assumption is fulfilled or not. Table 1 showed that digital literacy ability had a significance value of 0.916, and the HOTS

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had a significance value of 0.462. In conclusion, the dependent variables satisfied the assumption of univariate normality.

The following step involves running a multivariate test to see if the three learning models have the same capacity to affect the digital literacy and HOTS skills of elementary school children. The result is as follows:

Table 3: Results of Multivariate Test

Multivariate Tests[a]						
Effect		**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Intercept	Pillai's Trace	.999	148584.726[b]	2.000	296.000	.000
	Wilks' Lambda	.001	148584.726[b]	2.000	296.000	.000
	Hotelling's Trace	1003.951	148584.726[b]	2.000	296.000	.000
	Roy's Largest Root	1003.951	148584.726[b]	2.000	296.000	.000
Learning_Model	Pillai's Trace	1.235	239.488	4.000	594.000	.000
	Wilks' Lambda	.017	984.682[b]	4.000	592.000	.000
	Hotelling's Trace	42.836	3159.189	4.000	590.000	.000
	Roy's Largest Root	42.490	6309.713[c]	2.000	297.000	.000
a. Design: Intercept + Learning_Model						
b. Exact statistic						
c. The statistic is an upper bound on F that yields a lower bound on the significance level.						

The significance values of Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root at a significant level of 0.05 can be used to determine if the learning model influences. Given that the sig found in Table 3 is 0.000, which is less than 0.05, different teaching strategies might have diverse effects on students, in terms of their digital literacy and HOTS. Therefore, more research is required to discover how much the effectiveness of teaching techniques affects students' digital abilities and HOTS.

The next calculation is the homogeneity test. Homogeneity test is a requirement for additional testing. The homogeneity test results are as follows:

Table 4: Calculation Results of Levene test

Levene's Test of Equality of Error Variances[a]					
		Levene Statistic	**df1**	**df2**	**Sig.**
Digital_Literacy	Based on Mean	81.979	2	297	.745
	Based on Median	32.055	2	297	.248
	Based on Median and with adjusted df	32.055	2	137.458	.375
	Based on trimmed mean	59.469	2	297	.190
HOTS	Based on Mean	1.548	2	297	.214
	Based on Median	3.730	2	297	.251
	Based on Median and with adjusted df	3.730	2	269.248	.253
	Based on trimmed mean	1.966	2	297	.142
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.					
a. Design: Intercept + Learning_Model					

Table 4 showed that the result of Levene's test for equality of error variance is more than 0.05. As a result, the learning model category's presumption that the range of digital literacy skills

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and HOTS skills is similar was met. The test for between-subject effects was the preceding measurement. This test tries to ascertain whether learning models had an impact on digital literacy skills and higher-order thinking skills. The results were as follows:

Table 5: Test of Between-Subjects Effects

Tests of Between-Subjects Effects						
Source	**Dependent Variable**	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	Digital_Literacy	76568.780[a]	2	38284.390	2442.351	.000
	HOTS	69018.167[b]	2	34509.083	4147.089	.000
Intercept	Digital_Literacy	1725511.680	1	1725511.680	110078.953	.000
	HOTS	1654958.413	1	1654958.413	198882.686	.000
Learning_Model	Digital_Literacy	76568.780	2	38284.390	2442.351	.000
	HOTS	69018.167	2	34509.083	4147.089	.000
Error	Digital_Literacy	4655.540	297	15.675		
	HOTS	2471.420	297	8.321		
Total	Digital_Literacy	1806736.000	300			
	HOTS	1726448.000	300			
Corrected Total	Digital_Literacy	81224.320	299			
	HOTS	71489.587	299			
a. R Squared = .943 (Adjusted R Squared = .942)						
b. R Squared = .965 (Adjusted R Squared = .965)						

Based on table 5, the significant value of digital literacy skills is 0.00 in the learning model line. Digital literacy skills are impacted by the employment of this learning model because the sig. value is more than 0.005. The HOT ability line, which has a sig. value of 0.00, likewise shows this. Therefore, it may be inferred that using the learning model has an impact on students' HOTS. It will be determined which method makes the value of digital literacy skills and HOTS abilities high because there is a significant influence. A multiple comparison test was then performed.

Table 6: Multivariate Compression

Dependent Variable	**(I) Metode**	**(J) Metode**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Digital_Literacy	Conventional Learning	Digital Class Conventional	-.0722	.60281	.063	-1.773	1.606
		Digital Class Based Etno-Social	.0000	.60281	.000	-1.700	1.700
	Digital Class Conventional	Conventional Learning	.0722	.60281	.067	-1.606	1.773
		Digital Class Based Etno-Social	.0722	.60281	.000	-1.606	1.773
	Digital Class Based Etno-Social	Conventional Learning	.0000	.60281	.000	-1.700	1.700
		Digital Class Conventional	-.0722	.60281	.000	-1.773	1.606

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HOTS	Conventional Learning	Digital Class Conventional	-1.722	.60281	.078	-2.575	018
		Digital Class Based Etno-Social	-5.805*	.60281	.000	-7.658	-4.053
	Digital Class Conventional	Conventional Learning	1.7222	.60281	.059	-.018	2.575
		Digital Class Based Etno-Social	-4.1722*	.60281	.000	-5.825	-2.120
	Digital Class Based Etno-Social	Conventional Learning	-5.805*	.60281	.000	4.053	7.658
		Digital Class Conventional	-4.1722*	.60281	.000	2.120	5.825
Based on observed means The error term is Mean Square(Error) = 3.237 *. The mean difference is significant at the .05 level							

The sig. value obtained from table 6 in the digital literacy skills column was 0.063, which is higher than the sig. level employed, which was 0.05. Therefore, using traditional learning models and traditional digital classroom learning models did not significantly alter the effectiveness of digital literacy skills. A sig. value of 0.000 was found in the class that employed the traditional digital classroom learning model and the ethnic-social-based digital classroom learning model, which was lower than the sig. level used, which was 0.05. Therefore, when applied to traditional digital classroom learning models and ethnic-social-based digital classroom learning models, there was a considerable difference in the effectiveness of digital literacy skills.

The sig. value obtained from table 6 in the HOTS column is 0.78, which is higher than the significance level used, which is 0.05. Therefore, applying conventional learning models and conventional digital classroom learning models does not significantly alter HOTS scores. A sig. value of 0.000 was found in the class that employed both the traditional digital class learning model and the ethnic-social-based digital class learning model, which was less than the 0.05 significance level used. Therefore, there is a big difference in HOT ability scores when used with traditional digital classroom learning models and ethnic-social-based digital classroom learning models.

These findings supported the notion that both traditional digital classroom learning models and ethnic-social-based digital classroom models can enhance the digital literacy and HOT skills of elementary school pupils. Table 1 showed that the class using the traditional digital classroom learning methodology received an average score of 79.59 for digital literacy and a HOT score of 73.99. This score was lower than that of the class that used the ethnic-social-based digital classroom learning model; in that class, the HOT ability score was 92.99, and the average value of digital literacy skills was 93.26. This demonstrated how using an ethnic-social-based digital classroom learning strategy can enhance students' HOT and digital literacy skills.

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Discussion

According to the measuring results, elementary school kids' digital literacy abilities and HOT skills were impacted by the ethnic-social-based digital classroom learning model. Mashhadi & Kargozari's (2011) study, which claimed that using digital classrooms can improve teacher and student interaction, supported these findings. It was more effective for teachers to communicate with students online rather than in person. Digital classroom learning, according to Lin & Chen's (2017) research, could enhance student learning results and motivation. This is because digital classes are created employing technological tools to encourage students to engage in novel learning processes. According to research by Yamaç, ztürk, and Mutlu (2020), elementary school pupils' writing and activity levels could be enhanced by the digital learning process. The use of tablets for writing by primary school children might be encouraged via the digital learning process.

Because they might publish their writing to the offered class blog for other students to read and comment on, students got motivated to improve the quality of their writing. The digital classroom learning technique used in Taiwan, according to research by Cheng & Weng (2017), was able to raise student achievement. Schools and teachers supported this by offering top-notch digital classroom services so that kids might access learning resources appropriately. The following study was done by Vidergor (2021), who found that digital classroom learning can boost primary school pupils' engagement, teamwork, and motivation. The study's findings showed that students preferred the online learning environment, which encouraged group learning. Additionally, Putra et al. (2021) indicated that mobile-augmented reality used in digital lectures could enhance students' problem-solving skills and attitudes toward science. According to research by Ozerbas & Erdoan, students could boost their self-efficacy by using digital classroom learning.

According to the new findings, the ethnic-social-based digital classroom learning paradigm could enhance students' HOT and digital literacy skills, which is a novel discovery. This ethnic-social-based digital class learning approach was created and tailored to the needs of primary school kids and the emerging 4.0 era. According to this study, this technique could help elementary school kids become more digitally literate. The digital classroom learning approach, which demands that students be able to use the internet, is one of the factors that contribute to this. You can only use the ethnic-social-based digital classroom learning approach if you have reliable internet access. To access all the elements in the digital class, students were expected to be able to utilize the internet. Students must also be able to use different search engines to access and gather information for the learning resources provided.

One of the supporting variables in enhancing elementary school pupils' digital literacy abilities was using search engines to get information (Hahnel et al., 2016; Dewi, Hasanah, & Zuhri, 2021). Beyond that, this digital classroom learning strategy with an ethnic-social-based helped pupils understand hypertext in a web browser. Understanding and reading hypertext was a necessary ability for hypertextual navigation. This ability was crucial for the educational materials and exercises offered in ethnic-social-based online classrooms. This was because reading books online would differ from reading regular textbooks. Students would find it

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simpler to comprehend the sources of information offered with this skill (Reiber-Kuijpers, Kral, & Meijer, 2021; Mursidi, Buyung, & Murdani, 2022). Additionally, as part of this digital classroom learning approach, students must be able to think critically, evaluate what they learn online, and determine the reliability and accuracy of the information. Students were expected to research social issues connected to the topic being covered in the ethnic-social-based digital classroom learning process. In this procedure, information outside of the available learning resources must be found by the pupils. Students must be able to determine which information was reliable before using it.

This contributed to the improvement of elementary school kids' digital literacy skills. Additionally, this ethnic-social-oriented digital classroom learning approach demanded students assemble knowledge, create collections of data from many sources, and have the capacity to gather and objectively assess facts and opinions. Students in elementary school were expected to be able to organize and locate information obtained during the information search process. Students would need to have mental control to develop information relevant to the process of problem-solving to find this information (Triawang & Kurniawan, 2021). This would then help pupils in elementary school to become more digitally literate.

This digital classroom learning technique could enhance elementary school students' HOT skills and digital literacy skills. Students must have the ability to think uniquely to succeed in HOTS (Kazemi, Yektayar, & Abad, 2012). The ability of pupils to analyze information, evaluate problems, and come up with solutions to those problems was known as the HOTS ability (Ismail et al., 2018). Students were expected to be able to analyze the social issues presented in this ethnic-social-based digital classroom learning approach. Students were exposed to social context issues.

Students were expected to be able to relate the problem analytically. The outcomes of these relationships were presented so that students could comprehend the actual nature of problems. This was what causes primary school pupils' HOT skills to automatically improve (Lin et al., 2016; Silberman et al., 2021). Additionally, in the ethnic-social-based digital classroom learning paradigm, students were required to evaluate these issues after being able to analyze them. Students would participate in this evaluating process by separating facts from views, separating certainties from constrained conclusions, questioning the veracity of claims, separating connected information from unrelated information, and coming to firm conclusions. Assessment of kids with HOTS in elementary school would be enhanced by this procedure (Wu, 2016; Amponsah, Kwesi, & Ernest, 2019).

Additionally, to employ this learning paradigm, students must be able to come up with answers to the problems provided. This solution's development was carried out as part of HOTS. Based on the analysis and evaluation of the information, students used their abilities to come up with the best answer. Students would use their critical and creative problem-solving skills to solve these challenges by using their mental thinking abilities (Castilla et al, 2018; Yuan, Liu, & Kuang, 2021). This enabled the ethnic-social-based learning paradigm to enhance primary school kids' HOT skills.

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CONCLUSION

The results of this study showed that using the three learning models—conventional learning models, conventional digital classroom learning models, and ethnic-social-based digital classroom learning models—had an impact on higher-order thinking skills and digital literacy. According to the study's findings, the traditional digital classroom learning model and the ethnic-social-based model significantly increased primary school pupils' HOT skills and digital literacy skills. To improve the digital literacy and HOT skills of primary school pupils, the ethnic-social-based digital classroom learning paradigm is popular.

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References

1) Abdulai, A. F., Tiffere, A. H., Adam, F., & Kabanunye, M. M. (2021). COVID-19 information-related digital literacy among online health consumers in a low-income country. *International journal of medical informatics*, *145*, 104322.

2) Adedoyin, F. F., Bekun, F. V., Driha, O. M., & Balsalobre-Lorente, D. (2020). The effects of air transportation, energy, ICT and FDI on economic growth in the industry 4.0 era: Evidence from the United States. *Technological Forecasting and Social Change*, *160*, 120297.

3) Amponsah, S., Kwesi, A. B., & Ernest, A. (2019). Lin's creative pedagogy framework as a strategy for fostering creative learning in Ghanaian schools. *Thinking Skills and Creativity*, *31*, 11-18.

4) Anderson, R. D. (1994). *Issues of curriculum reform in science, mathematics, and higher order thinking across the disciplines*. US Department of Education, Office of Educational Research and Improvement, Office of Research.

5) Breakstone, J., McGrew, S., Smith, M., Ortega, T., & Wineburg, S. (2018). Why we need a new approach to teaching digital literacy. *Phi Delta Kappan*, *99*(6), 27-32.

6) Castilla, D., Botella, C., Miralles, I., Bretón-López, J., Dragomir-Davis, A. M., Zaragoza, I., & Garcia-Palacios, A. (2018). Teaching digital literacy skills to the elderly using a social network with linear navigation: A case study in a rural area. *International Journal of Human-Computer Studies*, *118*, 24-37.

7) Cheng, Y. H., & Weng, C. W. (2017). Factors influence the digital media teaching of primary school teachers in a flipped class: A Taiwan case study. *South African Journal of Education*, *37*(1), 1-12.

8) Dewi, R. S., Hasanah, U., & Zuhri, M. (2021). Analysis Study of Factors Affecting Students' Digital Literacy Competency. *Ilkogretim Online*, *20*(3), 4242-431.

9) Dilberoglu, U. M., Gharehpapagh, B., Yaman, U., & Dolen, M. (2017). The role of additive manufacturing in the era of industry 4.0. *Procedia manufacturing*, *11*, 545-554.

10) Hahnel, C., Goldhammer, F., Naumann, J., & Kröhne, U. (2016). Effects of linear reading, basic computer skills, evaluating online information, and navigation on reading digital text. *Computers in Human Behavior*, *55*, 486-500.

11) Hamimah, H., Zuryanty, Z., Kenedi, A. K., & Nelliarti, N. (2019). The Development of the 2013 Student Curriculum Book Based on Thinking Actively in Social Context for Elementary School Students. *Al Ibtida: Jurnal Pendidikan Guru MI*, *6*(2), 159-176.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.8315043

12) Hasanah, U., & Dewi, R. S. (2019, October). Integrated Learning Design Based on Google Classroom to Improve Student Digital Literacy. In *2019 5th International Conference on Education and Technology (ICET)* (pp. 108-111). IEEE.

13) Hasanah, U., Dewi, R. S., & Ratnaningsih, S. (2020, October). Effectiveness of digital teaching materials based on google classroom to improve digital literacy competencies during the covid-19 pandemic period. In *2020 6th international conference on education and technology (icet)* (pp. 59-63). IEEE.

14) He, W., Zhang, Z. J., & Li, W. (2021). Information technology solutions, challenges, and suggestions for tackling the COVID-19 pandemic. *International journal of information management*, *57*, 102287.

15) Heong, Y. M., Othman, W. B., Yunos, J. B. M., Kiong, T. T., Hassan, R. B., & Mohamad, M. M. B. (2011). The level of marzano higher order thinking skills among technical education students. *International Journal of Social Science and Humanity*, *1*(2), 121.

16) Heong, Y. M., Yunos, J. M., Othman, W., Hassan, R., Kiong, T. T., & Mohamad, M. M. (2012). The needs analysis of learning higher order thinking skills for generating ideas. *Procedia-Social and Behavioral Sciences*, *59*, 197-203.

17) Ibrahim, F., Susanto, H., Haghi, P. K., & Setiana, D. (2020). Shifting paradigm of education landscape in time of the COVID-19 pandemic: Revealing of a digital education management information system. *Applied System Innovation*, *3*(4), 49.

18) Ismail, N. S., Harun, J., Zakaria, M. A. Z. M., & Salleh, S. M. (2018). The effect of Mobile problem-based learning application DicScience PBL on students' critical thinking. *Thinking Skills and Creativity*, *28*, 177-195.

19) Kazemi, F., Yektayar, M., & Abad, A. M. B. (2012). Investigation the impact of chess play on developing meta-cognitive ability and math problem-solving power of students at different levels of education. *Procedia-Social and Behavioral Sciences*, *32*, 372-379.

20) Kenedi, A. K., Ahmad, S., Sofiyan, T. A. N., & Helsa, Y. (2019). The Mathematical Connection Ability of Elementary School Students in the 4.0 Industrial Revolution Era. *International Journal of Innovation, Creativity and Change*, *5*(5), 458-472.

21) Kenedi, A. K., Helsa, Y., Ariani, Y., Zainil, M., & Hendri, S. (2019). Mathematical Connection of Elementary School Students to Solve Mathematical Problems. *Journal on Mathematics Education*, *10*(1), 69-80.

22) Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. *Heliyon*, *7*(6), e07309.

23) Li, Y., Dai, J., & Cui, L. (2020). The impact of digital technologies on economic and environmental performance in the context of industry 4.0: A moderated mediation model. *International Journal of Production Economics*, *229*, 107777.

24) Lin, M. H., & Chen, H. G. (2017). A study of the effects of digital learning on learning motivation and learning outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7), 3553-3564.

25) Lin, M., Preston, A., Kharrufa, A., & Kong, Z. (2016). Making L2 learners' reasoning skills visible: The potential of computer supported collaborative learning environments. *Thinking Skills and Creativity*, *22*, 303-322.

26) Mashhadi, V. Z., & Kargozari, M. R. (2011). Influences of digital classrooms on education. *Procedia Computer Science*, *3*, 1178-1183.

27) Miranda, J., Navarrete, C., Noguez, J., Molina-Espinosa, J. M., Ramírez-Montoya, M. S., Navarro-Tuch, S. A., ... & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.8315043

in engineering education. *Computers & Electrical Engineering*, *93*, 107278.

28) Mursidi, A., Buyung, B., & Murdani, E. (2022). Digital Literacy Competence Levels of Indonesian Junior High School Students Based on Activities Through The 5m Approach. *JETL (Journal of Education, Teaching and Learning)*, *7*(2), 229-236.

29) Ozerbas, M. A., & Erdogan, B. H. (2016). The effect of the digital classroom on academic success and online technologies self-efficacy. *Journal of Educational Technology & Society*, *19*(4), 203-212.

30) Pabbajah, M., Abdullah, I., Widyanti, R. N., Jubba, H., & Alim, N. (2020). Student demoralization in education: The industrialization of university curriculum in 4.0. Era Indonesia. *Cogent Education*, *7*(1), 1779506.

31) Perdana, R., Yani, R., Jumadi, J., & Rosana, D. (2019). Assessing students' digital literacy skill in senior high school Yogyakarta. *JPI (Jurnal Pendidikan Indonesia)*, *8*(2), 169-177.

32) Porat, E., Blau, I., & Barak, A. (2018). Measuring digital literacies: Junior high-school students' perceived competencies versus actual performance. *Computers & Education*, *126*, 23-36.

33) Purnama, S., Ulfah, M., Machali, I., Wibowo, A., & Narmaditya, B. S. (2021). Does digital literacy influence students' online risk? Evidence from Covid-19. *Heliyon*, *7*(6), e07406.

34) Putra, A., Sumarmi, S., Sahrina, A., Fajrilia, A., Islam, M., & Yembuu, B. (2021). Effect of mobile-augmented reality (MAR) in digital encyclopedia on the complex problem solving and attitudes of undergraduate student. *International Journal of Emerging Technologies in Learning (IJET)*, *16*(7), 119-134.

35) Ramadhan, S., Mardapi, D., Prasetyo, Z. K., & Utomo, H. B. (2019). The development of an instrument to measure the higher order thinking skill in physics. *European Journal of Educational Research*, *8*(3), 743-751.

36) Reiber-Kuijpers, M., Kral, M., & Meijer, P. (2021). Digital reading in a second or foreign language: A systematic literature review. *Computers & Education*, *163*, 104115.

37) Silberman, D., Carpenter, R., Takemoto, J. K., & Coyne, L. (2021). The impact of team-based learning on the critical thinking skills of pharmacy students. *Currents in Pharmacy Teaching and Learning*, *13*(2), 116-121.

38) Sun, B., Loh, C. E., & Nie, Y. (2021). The COVID-19 school closure effect on students' print and digital leisure reading. *Computers and Education Open*, *2*, 100033.

39) Tambunan, H. (2019). The Effectiveness of the Problem Solving Strategy and the Scientific Approach to Students' Mathematical Capabilities in High Order Thinking Skills. *International Electronic Journal of Mathematics Education*, *14*(2), 293-302.

40) Tanujaya, B., Mumu, J., & Margono, G. (2017). The Relationship between Higher Order Thinking Skills and Academic Performance of Student in Mathematics Instruction. *International Education Studies*, *10*(11), 78-85.

41) Triawang, G., & Kurniawan, E. (2021). The Effect of Digital Literacy towards the Selection of Social Science Teacher Learning Media. *Pegem Journal of Education and Instruction*, *11*(4), 316-319.

42) Vélez, A. P., & Zuazua, I. I. (2017). Digital literacy and cyberconvivencia in primary education. *Procedia-Social and Behavioral Sciences*, *237*, 110-117.

43) Vidergor, H. E. (2021). Effects of digital escape room on gameful experience, collaboration, and motivation of elementary school students. *Computers & Education*, *166*, 104156.

44) Wu, L. Y. (2016). Children's formation and representations of money-related thinking in graphical complexes: Compound relation operations and creative high-order thinking. *Thinking Skills and*

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.8315043

Creativity, *19*, 232-245.

45) Xie, X., Siau, K., & Nah, F. F. H. (2020). COVID-19 pandemic–online education in the new normal and the next normal. *Journal of information technology case and application research*, *22*(3), 175-187.

46) Yamaç, A., Öztürk, E., & Mutlu, N. (2020). Effect of digital writing instruction with tablets on primary school students' writing performance and writing knowledge. *Computers & Education*, *157*, 103981.

47) Yuan, Y. H., Liu, C. H., & Kuang, S. S. (2021). An innovative and interactive teaching model for cultivating talent's digital literacy in decision making, sustainability, and computational thinking. *Sustainability*, *13*(9), 5117.

48) Zulfiati, H. M., Praheto, B. E., & Sudirman, A. (2021). The Role of Social Capital in Fostering Character Education in Primary Schools: Ki Hadjar Dewantara's Perspectives. *Al-Bidayah: jurnal pendidikan dasar Islam*, *13*(1), 215-236.