Seesaw Based Digital Learning to Increase Higher Order Thinking Skills of Basic School Students in The Pandemic Period

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Abstract: The purpose of this study was to analyze the effectiveness of digital seesaw-based learning in improving students' higher-order thinking skills. This study uses Research and Development. The study procedure uses the dick and Carrey model which has ten stages. The instrument in this study used a questionnaire to determine the feasibility of the media in terms of expert validation and field testing and then used a test instrument to measure students' higher-order thinking skills. Evaluation is carried out in three stages; the first stage is expert judgment carried out by media and material experts. The step was evaluated by a small group of ten students. The test results state that digital teaching materials are suitable for use. To see the effectiveness of the product developed, the newest field group was followed by a total of 30 students at SDS Laboratory. Analysis of test results shows the difference in learning outcomes between pre-test and post-test. Judging from the average value, it shows that the digital teaching materials based on the seesaw developed are effectively used in improving student's thinking skills of elementary school students. The novelty of this research includes the digital learning design developed by the researcher which is integrated with the aspects of high-level thinking skills of students and researchers combining several applications such as PowToon, phet, video scribe which are packaged in the seesaw platform. Of course, the results of this study can be a very interactive digital learning innovation and can increase student's higher-order thinking skills in the pandemic period.

Keywords: digital learning, seesaw, student's higher-order thinking skills

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INTRODUCTION

Education in the twenty-first century presents a big challenge to students, teachers, and education providers in improving the quality of learning properly. To achieve this target, we as education practitioners need to create learning-oriented 21st-century competencies such as critical thinking, communication, collaboration, and creativity (Rahardjanto et al., 2019). Quality learning can equip students in facing challenges in the era of globalization. One indicator of quality learning is that it can teach students to learn independently and develop higher-order thinking skills. Currently, the learning carried out by teachers in the classroom emphasizes more on the aspects of knowledge and understanding, while the aspects of analyzing, evaluating, and even creating which are part of higher-order thinking skills are only a small part of the learning process. This causes students to be less trained to develop reasoning power in solving problems in real life. So that students' high-order thinking skills cannot develop properly.

A person's higher-order thinking skills can be measured through several components, among others Interpretation skills, analytical skills, evaluation skills, inference skills, explanation skills, and reflection skills. "Critical cognitive skills are required to initially compose and enable the continuous revision of (Abidinsyah et al., 2018; Duchovičová et al., 2019; Widana, 2017). The six abilities try to be formed deliberately to develop higher-order thinking skills. When these abilities begin to be formed, it will allow for continuous reflection in the framework of training in the process of forming higher-order thinking skills. If someone already has the six abilities above, then that person already has high-order thinking skills. These high-order thinking skills need to be trained from an early age. This skill not only requires the ability to remember but also requires other higher

abilities, such as the ability to think creatively and critically (Mulnix, 2012).

In learning that is oriented towards higher-order thinking skills, it must involve three aspects of higher-order thinking skills, namely transfer of knowledge, critical and creative thinking, and problem-solving. (Bano et al., 2018; Kaeophanuek et al., 2019; Snyder & Snyder, Nd). In conjunction with higher-order thinking skills as a transfer of knowledge, learning will unify thinking skills according to the cognitive, affective, and psychomotor domains. then higher-order thinking skills as critical and creative thinking. In simple terms, planned learning needs to focus on questions, analyze/assess arguments and data, define concepts, determine conclusions, use logical analysis, process and apply information and use the information to solve problems. (AYH & ZNS, 2017; Shively et al., 2018). Also, critical and creative thinking skills are a process where all knowledge and skills are mobilized in solving problems that arise. Furthermore, in the aspect of higher-order thinking skills as problem-solving. In this case, problem-solving is a method of solving a problem. Ideally, learning activities are not only focused on getting as much knowledge as possible. However, learning also includes aspects of how to use all the knowledge gained to deal with new situations or solve special problems that are related to the material being studied. The purpose of problem-solving learning is that students become skilled at selecting relevant information (Bogan et al., 2012; Haara, 2018; Raiyn & Tilchin, 2015).

In realizing 21st-century learning amid the Covid-19 pandemic, an integrated digital learning design is needed with higher-order thinking skills inside it. In this case, the researcher developed Seesaw-based digital learning. Seesaw is an online learning platform that can be used by all education practitioners in online learning (Dhawan, 2020; Nations, 2020; Note et al., Nd). Besides being an open resource, this platform can also implement authentic assessments because it has a journal feature that is used as an assessment material for student portfolios. The advantage of this platform is that students can build creative ideas between friends and groups; teachers can save learning time in class and can build effective relationships with parents openly. Seesaw can share information with students, parents, and teachers collaboratively. Students can also build or design innovative creations and works according to the performance competencies agreed upon with the subject teacher (Saliyeva et al., 2016). Seesaw is here and brings a change in the way teachers think about designing authentic online assessments with broad speck. Through this platform, teachers can provide information to parents of students about what students are doing in their classes, and parents through online classes can also control children's behavior in an integrated manner with the teacher (ETF, 2018). Also, the learning design developed by the researcher combines several online learning applications that are packaged in a seesaw platform such as phet, PowToon, quizizz, and many others. This is to make learning designs more interactive and contextual for elementary school students.

The seesaw-based digital learning developed by researchers is very relevant to the current pandemic, where the entire learning process in schools is transferred to distance learning. The learning process is carried out online from the home of each student. With the change in learning activities from the habit of face-to-face learning activities in schools turning into distance learning, it requires educators to take part in the transformation to explore their creativity in delivering learning materials using available learning media, such as Google Class Room, Zoom, Google Meet, and so on. others so that learning can continue (Costley, 2015; Reimers et al., 2020; UNESCO & IESALC, 2020). Of course, this provides a different nuance, both for students and educators. This distance learning provides its challenges for educators in designing learning activities. Learning activities designed by educators should still be able to develop students' higher-order thinking skills. These skills are fundamental to 21st-century learning. Students who have higher-order thinking skills will be able to analyze, evaluate information or cases and be able to

create or solve problems with creative solutions. Therefore, we need a learning activity that is meaningful for students' scientific reasoning.

METHOD

Design Research

This study aims to develop a digital learning design to improve students' higher-order thinking skills. The method in this research uses research and development. This research is a digital learning design development with the seesaw application on the Energy theme. The procedure used in this study, using procedures and a research model using the Dick Carey model which has ten stages, namely: (1) Analysis of learning needs and objectives; (2) learning analysis; (3) analyzing students and the environment; (4) formulating performance objectives; (5) developing instruments; (6) developing learning strategies; (7) development and selection of learning materials; (8) carry out formative evaluation; (9) revising learning; (10) designing and implementing summative evaluations(Aldoobie, 2015).

Respondents

The research subjects were students in grade V SD Laboratory PGSD UNJ, totaling 30 respondents were at the small group trial stage 10 respondents and the field trial stage 30 respondents.

Data Analysis Technique

The data used are quantitative and qualitative. Qualitative data were obtained from requirements analysis, questionnaire test material experts, test design experts. Meanwhile, quantitative data were obtained from the results of product testing, namely field tests. The research design used was one group pretest-posttest design. In this design, before being given treatment, students are given a pre-test and at the end of their learning, students are given a posttest. This design is used to determine the effectiveness of the product being made.

RESULT AND DISCUSSION

The product that was successfully developed in this study is a seesaw-based digital teaching material. This teaching material is also made in digital form which is modified with the phet application and packaged in a seesaw-based learning platform. This makes it easier for teachers and students to join virtually, especially in this pandemic. Also, the content contained in it is oriented towards higher-order thinking skills. The content is packaged in the form of videos, stories, pictures, assignments, exercises to student activity worksheets.

Before designing a product, the researcher conducts a needs analysis to find appropriate teaching material information to be developed. After that, the researchers compile a product prototype designed per the material that has been formulated. The materials collected come from tried-and-tested sources so that the teaching materials are ready to be made and developed. After this teaching material was developed then it was continued with validation by material experts and media experts. The results of the validation assessment by material experts can be seen in table 1.

Table 1. Result of Assessment by Material Experts

Aspect	Average
Eligibility Content	3.89
Content Development	3.60
Final score	3,745

The results of the material expert's assessment on the feasibility aspect of digital teaching materials had a score of 3.89 and the content development aspect reached a score of 3.60 with the criteria of "very good". So, the final score of the product reaches a score of 3,745. This shows that the teaching material can be said to be suitable for use based on the assessment of material experts. Furthermore, this teaching material product has been assessed by media experts. The results of the media expert validation can be seen from the table.

Table 2. Result of Assessment by Media Experts

Aspect	Average
Eligibility Content	3.70
Accuracy Matter	4.00
Display Ratings	3.80
Legibility	3.85
Total	3.83

The results of the media expert's validation show that the feasibility aspect of the content gets an average value of the feasibility content aspect reaching a score of 3.70, accuracy matter reaching a score of 4.00, display rating reaching a score of 3.80, and readability reaching a score of 3.85. So, the final score of the feasibility of teaching materials reaches a score of 3.83 in the "very good" category. Thus, it can be said that the development of teaching material products based on the seesaw in elementary schools is appropriate as a development innovation to improve the student's thinking skill of elementary schools.

After being validated by media experts, then do the media expert trial Try- Small Group a ten-man out involving elementary school fifth-grade students. The trial results from Small-Group Try-Out can see in the table:

Table 3. Small-Group Try-Out Trial

Aspect	Average
Likes	3.80
Understanding	3.90
Display book	4.00
The final result	3.95

Based on the results of the try out small group trial, the results obtained with an average for the like aspect had a value of 3.80 with very good criteria. In the aspect of understanding, it has an average value of 3.90 with the criteria "very good". In the display aspect, the book has an average value of 4.00 with very good criteria. So, the final value of the try out small group trial reaches a score of 3.95, which means that digital teaching materials based on seesaw are suitable for use in small groups. The final test, after going through the stages of expert validation and small group trial testing and improvement, was then carried out by field participant trials with 30 students. The results of this trial are presented in the table:

Table 4. Try-Out Field Test

Aspect	Average
Likes	3.90
Understanding	3.89
Display book	3.92
The final result	3.85

Based on the results of the filled test, the average result for the aspect of the likes is 3.90 with very good criteria. In the understanding aspect, it has an average score of 3.89 with the criteria "very good". In the display aspect, it has an average value of 3.92 with very good criteria. So, the final value of the field test reaches a score of 3.85 which means that digital teaching materials based on thinking skills are suitable for use in large groups.

Field trials were carried out to determine the effectiveness of the product developed on students' higher-order thinking skills and to analyze the scores at the pretest and posttest. Following are the results obtained by the average posttest score

Table 5. Test Effectiveness Assessment

	Pretest	Posttest
Minimum Value	5.67	7.00
Maximum Value	8.50	10
Mean	7.08	8.5
Improvement	1.42	

At the pretest value, namely the average value of 7.08 after using this program to 8.5, there was an increase of 1.42. The minimum pretest score of 5.67 was increased to 7.00 and the maximum posttest score of 7.00 initially increased to 10. This indicates a significant increase in students' thinking skills. In the significance test using the two-sample t-test associated with the pretest and posttest, it shows the t-test value = 9.01 consulted with the t-table (a = 0.05: 30) of 1.696 indicating that there is a significant difference between the pretest score

and the posttest score. Researchers also identified higher-order thinking skills scores based on their aspects. The following is the percentage of students' high-order thinking skills scores at the pretest and posttest when viewed from the components as follows:

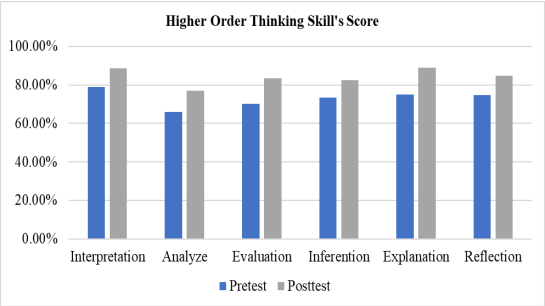

Figure 1. Student Thinking Skills Score at the Pretest and Posttest

In the interpretation aspect, the pretest score reached 78.89% and the posttest score was 88.59%. The analysis aspect achieved a pretest score of 65.90% and a posttest score of 76.80%. The evaluation aspect achieved a pretest score of 70.04% and 83.25% posttest. As for the inference aspect, the pretest score was 73.25% and the posttest score reached a score of 82.35%, the aspect explained, the pretest score reached 75.12%, the posttest score was 88.97%. As for the aspect of reflection, the pretest score reached 74.65% and the posttest score reached 84.57%. From these data, it can be said that there has been an increase in every aspect of the time before being given learning treatment with teaching materials and after being given treatment using teaching materials. Thus, the use of digital seesaw-based teaching material products can increase the higher-order thinking skills of elementary school students.

Based on the research findings, the seesaw-based digital learning developed by researchers is said to be feasible and effective in improving students' thinking skills. In this case, the researcher provides an innovative seesaw-based digital teaching material that is modified with several applications such as phet, video scribe, PowToon, and several other applications (Farooq & Benade, 2019). This aims to make teaching materials interactive and contextual for elementary school students.

One of them is Phet simulation media. This media was developed by a team from the University of Colorado in the United States to help students understand visual concepts. Phet simulation brings to life what is invisible to the eye through the use of intuitive graphics and controls such as click and drag manipulations, sliders, and radio buttons. Besides being easy to use and apply in the classroom, Phet can also be used online at the https://Phet.colorado.edu site. Phet requires a computer that has Java and/or Flash installed. The combination of seesaw and Phet simulation media is expected to be an innovation in digital learning in this pandemic. This combination is expected to build an active role for students in developing their knowledge.

The advantages of Phet simulation are that it can be used as a strategy that requires involvement and interaction with students, educates students to have constructivist thinking patterns, invites students to be able to combine their initial knowledge with virtual findings from the simulations that are run, making learning more interesting (Peterson-Ahmad et al., 2018; Pool, 1997; Reisoğlu et al., 2017; Titarenko & Little, 2017). This is because students can both learn and play in the simulation, and visualize the concept in the form of a model. Through a combination of seesaw-based learning and Phet simulation, which provides interactive physical media simulations and invites students to learn to explore directly, it is hoped that students will be more real in learning material, especially scientific phenomena. That way, students are more interested and more active in learning and can improve their thinking skills.

The results showed an increase in the scores of students' high-order thinking skills after learning to use the developed digital teaching materials. These results are seen from several components of higher-order ranking skills such as the ability to interpret, analyze, evaluate, infer, explain, and reflect. In interpretation ability, it is stated that students have understood and stated the

meaning or purpose of various experiences. As for the analytical skills, it means that students can identify the correct intentions and conclusions in the relationship between statements, concepts, or descriptions, while in evaluation skills, students can assess the credibility of statements or other presentations by assessing or describing a person's perceptions, experiences, situations, decisions, trust and judge the power of logic (Duchovičová et al., 2019; Farikah, 2019). Inference ability means the ability to identify and select the elements needed to form reasonable conclusions or hypotheses by paying attention to relevant information. Furthermore, students who have explanation ability are students who can state the results of the process based on evidence. The latter is the ability to reflect, where the awareness of students to monitor their cognitive processes, the elements used in the thought process, and the results developed, especially by applying skills in analyzing and evaluating one's ability to conclude. These six abilities can be trained using digital teaching materials developed by researchers.

This can be due to digital teaching materials developed by researchers, there are several inquiry activities that students must carry out. This activity is in the form of analyzing a concept, proving a concept, and solving a case. This activity was deliberately designed by researchers to integrate all components of higher-order thinking skills (Ellis & Bliuc, 2019; Siburian et al., 2019). In the learning process, students are trained in giving simple explanations, which contain; focusing questions, analyzing questions and asking, and answering questions about an explanation or statement, building basic skills, which consists of considering whether the source is reliable or not, and regarding and considering a report on the results of observations. concluding which consists of activities to deduce or consider the results of deductions, induce or consider the results of the induction, and make and determine the value of considerations, provide further explanations, which consist of identifying terms and definitions of considerations as well as dimensions, as well as identifying assumptions and setting strategies and techniques, which consists of determining actions and interacting with other people (Bogan et al., 2012; Costley, 2015; Gursoy & Bağ, 2018; Raiyn & Tilchin, 2016). Thus, students become accustomed to reasoning and exploring in dealing with cases and concepts. This mindset will lead to higher-order thinking skills.

CONCLUSION

Based on the research findings, it can be concluded that the seesaw-based digital learning developed by researchers is said to be feasible and effective in improving higher-order thinking skills during this pandemic. Its digital form can make it easier for students to access it anywhere and anytime. The results of this study can be used as a solution and input for all teachers, especially elementary school teachers in developing digital learning based on higher-order thinking skills during this pandemic. This product can also be a breakthrough in the world of education so that it can add to the repertoire of science.

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