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The Practicality and Effectiveness of the E-Worksheet with Creative Inquiry Based and HOTS Oriented "3D PageFlip" for Online Learning

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Abstract: Most students experienced difficulties in understanding electricity learning materials in online learning because this was delivered asynchronously without observation/investigation and interaction with its learning environment. To overcome this problem, a teaching material that is able to deliver natural facts and phenomena to display in one place/space, the Electronic Student's Working Sheet (ESWS) with 3D PageFlip is required. Material elaboration in this ESWS follows creative inquiry syntax with an orientation to higher order of thinking skill (HOTS). The objective of this research was to describe the practicality and effectiveness of the ESWS with Creative Inquiry Based and HOTS Oriented 3D PageFlip for online learning in improving self-efficacy and communication skill. This research used static one group pretest-posttest design. Research population was students in Public Senior High School 1 in Airnaningan, Tanggamus district, Lampung province. Two classroom samples were taken with cluster random sampling. Samples were divided into experiment and control groups. The experiment classroom was taught by using the ESWS with creative inquiry based and HOTS oriented 3D PageFlip and the control group was taught by using a regular student's working sheet containing questions and problems for exercises. Data were analyzed descriptively to describe self-efficacy understanding and communication skill. The differences of self-efficacy understanding and communication skill between experiment and control classrooms were analyzed with independent sample t-test. The research result showed that the ESWS with creative inquiry based and HOTS oriented 3D PageFlip was practical to use in physics learning with average implementation score by 87.03 and with very positive students' responses (94.44%). The ESWS with creative inquiry based and HOTS oriented 3D PageFlip was also effective in improving self-efficacy and communication with n-gains of 0.77 and 0.80 respectively and they belonged to high n-gain category.

Keywords: Practicality, Effectiveness, Communication

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INTRODUCTION

Self-efficacy is an important factor for students in covid-19 pandemic time to help them in solving abstract and complicated physics problems (Distrik, Rosidin, & Abdurrahman, 2020). The physics problem solving demands students to think critically, creatively, to be able to collaborate, and to have communication skill. The communication form in learning can be done by verbal and written forms. Scientific communication skill is very important for students to improve abilities of reading, listening, and writing. Teachers must be able to guide students to communicate such as giving brief explanations, providing more detail explanations, using strategies in solving problems, fast reading and identifying physics problems so that students are able to draw conclusions autonomously and be able to find out or create something new. Self-confidence toward self-ability can improve students' abilities in solving abstract and complicated physics problems. Students sometimes solve the physics problems properly, but they find difficulties to explain to other people because their communication skills both orally and in written are less concerned by teachers.

Self-efficacy takes an important role in improving motivation and performance. The higher the self-efficacy level is obtained, the higher the performance achievement will be. Exploiting students' self-efficacies is very important in improving educational quality (Fallan & Opstad, 2016). Self-efficacy is very influential to students' performances and to motivate students to work harder (Caprara, Barbaranelli, Steca, & Malone, 2006). Students with higher academic skills would have higher self-efficacy and vice versa (Tezer & Asiksoy, 2015). Students' successes in learning process are inseparable with the self-efficacy role. Self-efficacy is measured with three dimensions: *magnitude*, *generality* and *strength* (Bandura, 1997). *Magnitude* concerns with perception upon self-ability. High self-efficacy would produce high confidence in finishing difficult assignments, and oppositely lower self-efficacy would cause less confidence in finishing difficult assignments. *Generality* is the ability to assess self-confidence. *Strength* is to have a strong confidence upon self-competence, not easily giving up or being frustrated.

In academic activities, besides self-efficacy, communication skill is very required to deliver messages to other people both orally and in written form (Suryadi, 2004). Effective communication according to Rendhana (2019) includes (1) articulating thoughts and ideas creatively by using oral, written and non-verbal communication skills in varying contexts and forms; (2) listening effectively to understand meanings; (3) using communications for some purposes; (4) using varying media and technologies and assessing their effects; and (5) communicating effectively in different environments. In 21st century learning, communication skill is one of skills that students must master to be able to compete in employment market. Communication skills that students must master include verbal skill (speaking) and non-verbal skill (writing, reading, listening, and using media). Communication skill has a positive influence to someone's work performance (Biryanto, Hubeis, Matindas, & Sarma., 2018).

According to Greenstein (2012), there are 13 communication types. However, this research only used 2 indicators. They are (1) verbal communication such as communication skill in delivering ideas, asking questions, debating with scientific arguments; (2) and non-verbal communication including written form skill such as

writing all answers to student's working sheet (LKS) and writing observation/experiment result reports.

Learning in covid-19 pandemic time is done online by using *Google class* application, and this online learning can be done *synchronously* and *asynchronously*. In online learning, the teaching materials having important roles include student's working sheet (LKS), pictorial media, books, journals, and other teaching materials. Student's working sheet contains information and instructions from teachers to learners so that they would be able to do by themselves a learning activity by practicing and implementing learning result to obtain learning objectives (Dahar, 2006). The final student's working sheet in learning online have used 3D PageFlip Professional software. By using this software, students are able to see video, pictures, audio, hyperlinks, and other multimedia objects in one place to ease students to learn. In this electronic student's working sheet (ESWS), learning materials delivered by using creative inquiry syntax that is integrated into higher order of thinking skill (HOTS). ESWS by using 3D PageFlip is also designed in order students to be critical and creative by presenting varying natural phenomena and some questions that need short answers, more detail answers, using strategies to draw conclusions, smoothness, flexibility, and collaboration. In this ESWS, observation, experiment, and solving problem activities are also presented to see self-efficacy and communication skill of students in physics learning.

The problems statements in this research were (1) how did the practicality of the ESWS with Creative Inquiry Based and HOTS Oriented 3D PageFlip in physics learning; and (2) how did the effectiveness of the ESWS with Creative Inquiry Based and HOTS Oriented 3D PageFlip in physics learning.

METHOD

This was quantitative research by using experiment and control classrooms. Experiment classroom was taught by using ESWS with creative inquiry based and HOTS oriented 3D PageFlip, while control classroom was taught by using regular student's working sheet (LKS) for online learning.

Research Design & Procedures

Before the implementation of ESWS and regular student's working sheet in experiment and control classrooms, both classrooms were observed to see students' communication skills and self-efficacy measurement sheets were distributed. This research used static group pretest-posttest design (Fraenkel & Wallen, 2003). The research design is shown in Figure 1 below.

-	O_1	X	O_2
-	O_1	-	O_2

O_1 = self-efficacy and communication skill in conventional learning
O_2 = self-efficacy and communication skill after treatment
x = treatment with creative inquiry model
- = conventional learning

Figure 1. Research design

Population and Sample

Research population was students in Public Senior High School 1 in Airnaningan, Tanggamus district, Lampung province. Two classrooms' samples were taken by using cluster random sampling, and each classroom consisted of 34 students. The students' final test results in the even semester obtained sig. 2-tailed > 0.05. There was no difference between two classrooms, and it indicated that both classrooms had same initial abilities.

Data Collection and Instruments

Research instruments were observation sheets to observe ESWS implementation, communication skills, educators' capabilities in managing learning, general self-efficacy scale sheet, and student's response questionnaire. Learning implementation data were collected by using observation sheet. Student's response data were collected by using questionnaire. Self-efficacy data were collected by using questionnaire with general self-efficacy scale. Communication skill data were collected by using observation sheet and learning activity report.

Data Analysis

The analysis of product practicality was measured by using learning implementation observation sheet recorded by observers and by using student's response questionnaire. Learning implementation and student's response data were analyzed descriptively by grouping data and categorizing the learning implementation into low, moderate, and high categories. Students' responses were categorized into positive and negative responses. The effectiveness of electronic student's working sheet (ESWS) was analyzed inferentially. N-gain of self-efficacy and communication skills between experiment and control groups were analyzed by using independent t-test.

RESULT AND DISCUSSION

Before conducting tests in the field, self-efficacy and scientific communication skill instruments were tested for their validities and reliabilities. The validity test result showed that all problems in the instrument satisfied sig.(2-tailed < t_{able}), and reliability test derived Cronbachs coefficients of alpha 0.651 for self-efficacy test instrument and 0.640 for communication skill test instrument.

a. ESWS Practicality

1) ESWS implementation in Learning

The field tests were done in Public Senior High School 1 in Airnaningan to 34 students in classroom XII MIA 1 for the control group and 34 students in classroom XII MIA 2 for the experiment group. Before starting learning, questionnaires were given to both classrooms to measure initial abilities of self-efficacy and scientific communication skill of learners. ESWS implementation in learning consisted of

material delivery, scientific communication process, and self-reflection. ESWS implementation result can be seen in Table 1 below.

Table 1. ESWS implementation observation result during learning

No	Implementation indicator	Observer			Average
		I	II	II	
1	Syntax implementation	79.83	86.83	87.46	84.71
2	Social system	85.50	84.50	92.50	87.50
3	Reaction principle	79.75	87.50	82.50	83.25
4	Supporting system	95.00	90.50	95.50	93.67
5	Instructional and accompanying impacts	86.38	84.75	87.00	86.04
	Average	85.29	86.82	88.99	87.03

To see from some observational aspects, Table 1 shows that the average score of ESWS implementation is 87.03 and it belongs to high implementation category. It indicates that creative inquiry based ESWS is easy to implement in learning by teachers.

2) Student's Response toward ESWS

Student's response toward creative inquiry based ESWS is shown in Table 2 below.

Table 2. Student's response toward ESWS

No	Response	Percentage
1	Positive	94.44%
2	Negative	5.56%

Table 2 above shows student's positive response by 94.44 % toward the use of ESWS with creative inquiry based and HOTS oriented 3D PageFlip. It indicates that this ESWS is properly understood and easy to use by students.

The ESWS with creative inquiry based and HOTS oriented 3D PageFlip is practical to use in online learning to improve self-efficacy and communication skill in learning electricity teaching material. Its practicality is indicated by the average of ESWS implementation in learning. The implementation indication scores are 84.71 for syntax implementation, 87.50 for social system, 83.5 for reaction principle, 93.67 for supporting system and 86.04 for instructional and accompanying impacts. The total average of ESWS implementation is 87.03 and it belongs to high category for implementation. By scrutinizing each indicator, it can be seen that the average of implementation score is above 80. It means that the ESWS with creative inquiry based and HOTS oriented 3D PageFlip is easy to implement by teachers. Positive student's response by 94.44% indicates that this ESWS is very helpful in learning, easy to use, having structured material delivery, and easy to understand. Only a few of students (5.56 %) said that ESWS is less helpful in learning, difficult to use, and difficult to understand. It is because those students did not like physics subject, so that they were less motivated and focused in learning. The practicality of ESWS comes from the facts that it is designed based on learning theory studies for active student learning (constructivism); that it has delivery plot with creative inquiry steps directed for higher

order of thinking skill with material delivery and operational buttons of ESWS that are easy to understand by teachers and students; and this ESWS is in accordance with online learning with a clear objective. This creative inquiry based and HOTS oriented ESWS is delivered with 3D PageFlip Professional software in *flash flipbook* application that is able to convert pdf, Word, PowerPoint, and excel files into *flipbook* form. This eases students in accessing learning materials completely in any time depending on internet network availability.

b. ESWS Effectiveness

Normality test was done before doing inferential analysis to find out significance of average difference of students' communication skills between experiment and control classrooms. The normality test results of communication skill and self-efficacy are shown in Table 3 below.

Table 3. Normality test results

Indicator	Data	Significance	Conclusion
Communication skill	Experiment	0.107	Normal
	Control	0.000	Not Normal
Self-efficacy	Experiment	0.152	Normal
	Control	0.003	Not Normal

Table 3 shows that normality test result of communication skill and self-efficacy data of experiment classroom derives sig. (2-tailed) > 0.005 and it indicates that final test data are normal. The normality test result of communication skill and self-efficacy data of control classroom derives sig. (2-tailed) < 0.005 and it indicates that final test data are not normal. Therefore, the differences of communication skill and self-efficacy between experiment and control classrooms would be analyzed by using non-parametric statistic with Mann-Whitney U test.

The Mann-Whitney U test results of communication skill and self-efficacy differences between experiment and control classrooms are shown in Table 4 below.

Table 4. N-gains of scientific communication skill and self-efficacy

School	Aspect	Classroom	Initial	Final	N-gain	Criterion	p. n-gain	p. final
Public Senior High School 1 in Airnaningan	*Self-Efficacy*	Experiment	51.005	88.82	0.77	High	0.164	0.209
		Control	0.00	85.15	0.71	High		
	Scientific communication skill	Experiment	52.21	90.15	0.80	High	0.000*	0.000*
		Control	50.74	76.32	0.50	Moderate		

*p < 0.05, significantly different at 95% confidence interval

Self-efficacy between experiment and control classrooms is not different (sig. (2-tailed > 0.05)). It means that the ESWS with creative inquiry based and HOTS oriented 3D PageFlip used in learning is effective, but it is not significantly different between experiment and control classrooms. Communication skill between experiment and control classrooms is significantly different both in term of n-gain and final observation result (sig. (2-tailed) < 0.05)). It indicates that the ESWS with creative inquiry based and HOTS oriented 3D PageFlip is effective in improving scientific communication skills of students.

The influences of the ESWS with creative inquiry based and HOTS oriented 3D PageFlip to scientific communication skill and self-efficacy ability can be seen in *effect size* test results in Table 5 below.

Table 5. *Effect size* test results

	Group	Mean	Deviation standard	*Effect size*	Description
Self-efficacy	Experiment	0.63	0.077	0.4	Moderate
	Control	0.34	0.167		
Scientific communication skill	Experiment	0.20	0.11	1.42	High
	Control	0.08	0.05		

Table 5 shows that *effect size* score for self-efficacy is 0.4 and it belongs to weak category. The *effect size* score for scientific communication skill is 1.42 and it belongs to very strong category.

The ESWS with creative inquiry based and HOTS oriented 3D PageFlip is **effective** in improving self-efficacy and scientific communication skill. The improvement (n-gain) of self-efficacy by 0.77 belongs to high category and the improvement (n-gain) of scientific communication skill by 0.80 also belongs to high category. These are in line with a finding by Distrik, Undang, & Abdurrahman (2020) that HOTS-oriented creative inquiry model is able to improve self-efficacy and physics problem solving abilities of senior high school students in Lampung province, Indonesia. This result is also in Line with the finding by Çalışkan (2017) that anxiety in learning influences student's self-efficacy. Self-efficacy has a significant influence to student's academic ability. This means the ESWS with creative inquiry based and HOTS oriented 3D PageFlip is felicitous in building a student's confidence and communication skill in online learning.

Most of teaching material designs only focusing on cognitive improvement only and seldom focusing on non-cognitive improvement such as metacognition, self-efficacy, self-belief, self-confident, and communication skill; even though self-efficacy has an important role in improving cognitive knowledge. A strong self-efficacy is able to overcome obstacle and challenge in building problem solving ability (Distrik, Undang, & Abdurrahman, 2020). Oppositely, low self-efficacy would tend to reduce efforts and to give up, so that any easy problem would be difficult to understand. Student's self-efficacy can be built during online learning with teaching materials based on creative inquiry which is integrated with higher order of thinking skill (HOTS) and built in 3D PageFlip software. 3D PageFlip software is able to build a student's working sheet (ESWS) into a *flash* file which is embedded into an *html* web page or blog, so that

this will ease students to learn contextually by using social media accessible in a provided internet link. This student's working sheet follows creative inquiry model steps which is directed into the higher order of thinking skill (HOTS). Creative inquiry is an active learning model where students actively ask questions, think critically and creatively so that they are able to solve abstract and complex problems and able to communicate their finding results. Creative inquiry model can improve student's motivation and talent (Ozgur, & Yilmaz, 2017). Research finding by Mulyeni, Jamaris, & Supriyati (2017) also suggests that scientific process skill improvement can be done with inquiry model. There are some inquiry models that can be used in science learning; *demonstrated inquiry*, *structured inquiry*, *guided inquiry*, and *self-directed inquiry* (Llewllyn, 2013). Teachers in their implementations can use more than one inquiry models depending on the characteristics of materials to teach.

HOTS oriented creative inquiry model guides students into scientific questions, natural event or phenomenon observations or experiments. In creative inquiry model, teachers guide students to develop ideas, motivate them to do reflection and hypothesis abstraction. Students are also able to design their experiments, to explore questions and to test hypothesis they have made, to analyze, to identify patterns, and to integrate their perspectives to build models. In creative inquiry model students are guided to ask questions and answer them from their classmates or teachers or from other sources. In addition, students are also able to communicate and give arguments to their finding results, to compare with other explanations, to evaluate their own explanations and then teachers would review and assess what students have obtained during learning (Jeng & Chen, 2017).

The ESWS with creative inquiry based and HOTS oriented 3D PageFlip in its elaboration provide a space for students to communicate both orally and in written form. In other activities in the creative inquiry elaboration which is based on higher order of thinking skill (HOTS), students are guided to be more active in doing observations, asking questions, trying, discussing, and making analyses, so that students become critical and creative.

CONCLUSION

The ESWS with creative inquiry based and HOTS oriented 3D PageFlip is practical to use for improving self-efficacy and communication skill. This is indicated by the average of learning implementation by 87.03 and positive responses by most students (94.44%). The teaching materials in the ESWS with creative inquiry based and HOTS oriented 3D PageFlip are easy to use by teachers and students and are able to help students in learning. The ESWS with creative inquiry based and HOTS oriented 3D PageFlip is effective to improve self-efficacy (n-gain: 0.77) and communication skill ability (n-gain: 0.80) and these n-gains belong to high category.

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