CREATIVE INQUIRY-BASED E-WORKSHEET: A WAY TO IMPROVE STUDENT'S SELF-EFFICIENCY AND SCIENTIFIC COMMUNICATION SKILLS

Lisa Apriyani[1*], I Wayan Distrik[2], Undang Rosidin[3]

[1,2,3]Department of Physics Education, Postgraduate Program, Universitas Lampung, Indonesia

Corresponding author: lisaapriyani01@yahoo.com

Article Info	ABSTRACT
	The ability of self-efficacy and scientific communication is part of the important skills in the 21st century that must be practiced in learning. This study aims to improve self-efficacy and scientific communication skills using a creative inquiry-based e-worksheet. This study uses research and development methods that contain four stages, namely preliminary studies, planning and development, field testing, and dissemination. The sample of this research is the 68 12th-grade students of SMA N 1 Airnaningan. After product validation, obtained an average of 80.00% and declared valid. The average score of students' positive responses to the e-worksheet is 94.44%. While the effectiveness of the e-worksheet in improving self-efficacy and scientific communication skills was obtained from the results of the pretest and posttest with the experimental class N-gain value greater than the control class and the effect size self-efficacy value of 1.19 and scientific communication ability of 2.17 with high category. It was concluded that the e-worksheet based on creative inquiry was effective in increasing students' self-efficacy and scientific communication skills.

E-WORKSHEET BERBASIS *CREATIVE INQUIRY*: CARA UNTUK MENINGKATKAN *SELF-EFFICACY* DAN KOMUNIKASI ILMIAH SISWA

	ABSTRAK
	Self-efficacy dan kemampuan komunikasi ilmiah merupakan salah satu kemampuan penting di abad 21 untuk dilatih dalam pembelajaran. Penelitian ini bertujuan meningkatkan *self-efficacy* dan kemampuan komunikasi ilmiah menggunakan e-LKPD berbasis inkuiri kreatif. Penelitian ini menggunakan metode R&D yang memuat empat tahap yaitu studi pendahuluan, perencanaan dan pengembangan, uji lapangan, dan diseminasi. Sampel penelitian adalah 68 siswa kelas 12 SMA N 1 Airnaningan. Setelah dilakukan validasi produk, diperoleh rata-rata 80,00% dan dinyatakan valid. Skor rerata respon positif peserta didik terhadap e-LKPD sebesar 94,44%. Sedangkan efektivitas e-LKPD dalam meningkatkan *self-efficacy* dan kemampuan komunikasi ilmiah diperoleh dari hasil *pretest* dan *posttest* dengan nilai *N-gain* kelas eksperimen lebih besar dari kelas kontrol dan nilai *effect size self-efficacy* sebesar 1,19 dan kemampuan komunikasi ilmiah sebesar 2,17 dengan kategori tinggi. Maka disimpulkan bahwa e-LKPD berbasis inkuiri kreatif efektif meningkatkan *self-efficacy* dan kemampuan komunikasi ilmiah peserta didik.

1. INTRODUCTION

The selection of appropriate teaching materials and in accordance with the needs of teachers and students can certainly support the learning process to be more effective [1]. Teaching materials are a set of learning tools or tools, methods, limitations, and ways of evaluating that are designed systematically and attractively in order to achieve the expected goals [2]. In the implementation of the 2013 Curriculum, the learning process must be student-centered, so that one type of teaching material that can support the implementation is the Student Worksheet [3]. Worksheet is an activity sheet that contains information and instructions from the teacher to students so that they can work on a learning activity themselves, through practice or the application of learning outcomes to achieve learning objectives [4].

In the current learning process, students are required to be able to develop self-efficacy and scientific communication skills. The concept of self-efficacy refers to the beliefs possessed by students to be able to complete a certain task and beliefs about the results that will be obtained later [5]. Based on this, self-efficacy becomes an important factor to be studied related to aspects of individual identity [5]. Self-efficacy also affects people's choices in behavioral settings, the amount of effort they make to complete a task, and the length of time they persist in the face of obstacles [6]. In this context, students' examination of self-efficacy is essential for achieving success in solving complex problems. Self-efficacy affects performance and motivation, and only teachers with high self-efficacy can conduct inquiry learning [7] [8]. Physics learning requires students to think critically, creatively, able to collaborate, and have communication skills. Communication skills can be represented orally or in writing. Scientific communication skills are designed to improve scientific reading and writing skills as well as science learning skills [9]. Scientific communication is a skill to communicate scientific knowledge of findings and studies to various target groups for various purposes [10].

One of the learning models that can facilitate the development of students' abilities to increase self-efficacy and enable students to interact with each other is the creative-inquiry model. The inquiry model emphasizes critical, creative, and logical thinking processes [11]. Inquiry learning can increase students' motivation and talents. While the creative process model prioritizes the motivation to produce creative ideas and think logically [12]. Inquiry learning will describe inquiry as a process, inquiry as content, inquiry as strategy, and inquiry as context [13]. Inquiry-oriented provides an investigation (investigative nature), while from a pedagogical perspective, learning-oriented learning in inquiry constructivist learning model (constructivist model of learning) or in other terms is learning (active learning) [14].

Based on the results of the needs analysis in the form of a questionnaire addressed to high school students in Bandar Lampung (class XI SMA Negeri 7 Bandar Lampung and class XI students at SMA Negeri 5 Bandar Lampung), currently learning physics is still not attractive to students. This is due to the use of media and teaching materials which they think are less attractive. The existence of worksheet is not enough to help. Most of the students explained that the worksheet was only to do practice questions without any guidance from the teacher so that students were lazy to bring the worksheet to school. The questions in the worksheet have not been able to direct students to think at a higher level.

In addition to the needs analysis of students, a needs analysis in the form of a questionnaire was also addressed to several high school physics teachers. The first analysis is related to the use of learning media. Most teachers have used learning media, but only occasionally and not optimally. Next is the use of the worksheet, how to get the worksheet, and the purpose of using the worksheet. All teachers who were asked to fill out a

questionnaire revealed that they used worksheet in their classroom learning. The worksheet are usually obtained from publishers, not made by teachers. The teacher deliberately uses worksheet to facilitate the learning process. But in reality the existing worksheet also does not help the learning process. Worksheet is only used as a substitute for assignments or just to do practice questions. Regarding HOTS-oriented learning, the teacher revealed that the questions given had not been able to explore students' higher-order thinking skills. Students seem to only accept the material presented by the teacher, have not been able to develop their own material received.

Based on the description of the needs analysis, an electronic worksheet was developed so that there is no reason for students not to bring the worksheet to school because it can be opened using student gadgets. And also in the current emergency learning where students learn more online, the existence of this e-worksheet is expected to help students in learning. The attractiveness of the appearance of the e-worksheet is also very important so that students are interested in reading. For that, in its development required the right application. The application used in the development of this e-worksheet is 3D Page flip. With this application, the e-worksheet that will be developed does not only contain representations of images, words, diagrams, graphs, and equations like the e-worksheet that already existed before. Instead, add videos or moving animations that can attract students' attention.

In addition to the attractive appearance of the contents of the e-worksheet, of course, the right learning model is also needed. In this case, the combination of inquiry-creative learning model needs to be applied in physics learning. Learning by applying inquiry or creative alone is considered less effective, so it is necessary to combine the two models in the developed e-worksheet so that it can direct students to improve self-efficacy and scientific communication skills. Learning by using a creative inquiry model can improve student's motivation and talent [15]. The creative inquiry model provides feedback in learning that gives rise to student activity [16]. Therefore, e-worksheet based on creative inquiry has been developed using 3D Page flip oriented HOTS to improve students' self-efficacy and scientific communication skills. Based on research about the effect of inquiry based learning, inquiry learning can increase students' motivation and talents, while the creative process model prioritizes motivation to generate creative ideas and think logically [16]. So that by combining the two learning models (creative-inquiry) students' self-efficacy and scientific communication skills can be improved better. This is because the provision of videos, pictures, and practicum activities are arranged in stages according to sub-chapters according to creative inquiry learning steps to make it easier for students to be independent and make it easier for them to understand concepts in learning.

2. METHOD

This research uses research and development (R&D) methods. Research and Development is a research method used to produce certain products and test the effectiveness of these products [17]. In this study, the development model of Borg & Gall (1983) was used. The selection of the Borg & Gall model is based on consideration of the completeness of the stages of development activities. This model consists of 10 stages of activities which are grouped into four stages [18]. The selection of the development model is based on consideration of the completeness of the stages of development activities. The process of this research can be seen in Figure 1.
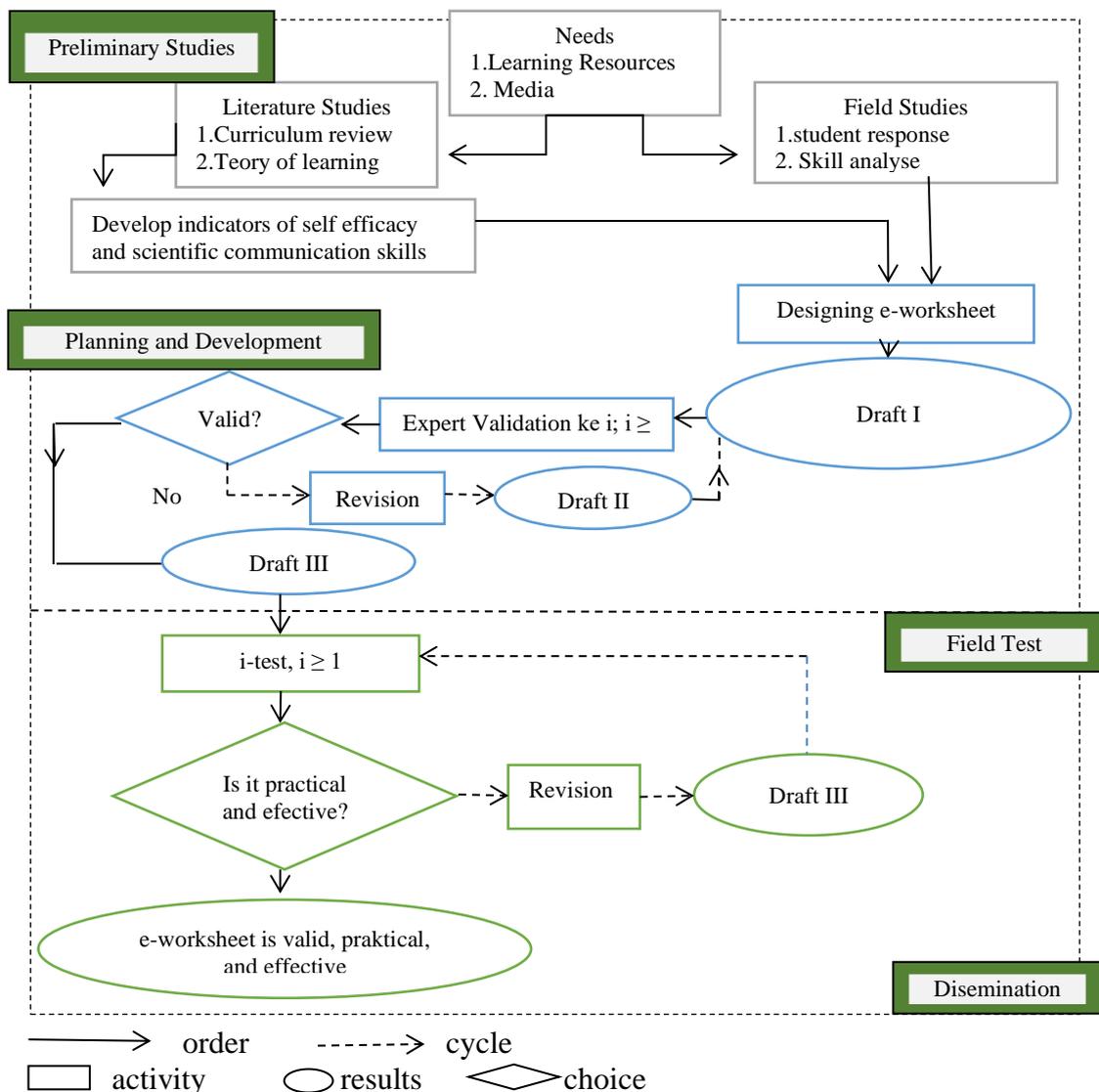
Figure 1. Research and Development Design Flowchart

Furthermore, the effectiveness analysis which includes validity and reliability tests is carried out. The validity test was conducted to determine the level of feasibility of the items to be used in this research. To calculate the validity of the items using the product moment correlation formula as follows:

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \qquad (1)$$

Notes:

r_{xy} : Empirical validity of the questions

N : number of subjects

X : the total score of each item of each student

Y : total score of each student [17]

The results of the validity test are interpreted in Table 1.

Table 1. Validity Coefficient Criteria [20]

Validity Coefficient	Note
$0.80 \leq r_{xy} \leq 1.00$	Very High
$0.60 \leq r_{xy} \leq 0.80$	High
$0.40 \leq r_{xy} \leq 0.60$	Medium

$0.20 \leq r_{xy} \leq 0.40$	Low
$0.00 \leq r_{xy} \leq 0.20$	Very Low

The criteria for items of good quality if the minimum coefficient of validity achieved is the moderate category. If the level of validity is below the medium category, then the items are revised or replaced. The items that have been corrected are then retested until they get a minimum result in the medium category.

Reliability test is carried out to determine the consistency of an item used as a measuring tool so that the results can be trusted. In this research to test the reliability of the items using the Kuder and Richardson method, namely by using the Cronbach alpha formula as follows:

$$r_{11} = \left(\frac{n}{n-1}\right)\left(1 - \frac{\Sigma Si^2}{\Sigma St^2}\right) \qquad (2)$$

Notes:

r_{11} : reliability coefficient

n : The number of questions issued

ΣSi^2 : Total score variance of each item

ΣSt^2 : Total variance [21]

The effectiveness of the e-worksheet which is implemented based on creative inquiry is determined by the results of the Self-efficacy and scientific communication skills of students in physics given before and after learning (assessment stage 1 and assessment stage 2) on static electricity material which is analyzed descriptively and inferentially. Descriptive analysis of the results of self-efficacy and scientific communication skills was carried out by calculating N-Gain. The N-Gain value test was carried out to see the increase in students' self-efficacy and scientific communication skills in physics. The N-Gain test can be performed using the gain formula according to Meltzer as follows [22]:

$$g = \frac{\text{Posttest score} - \text{Pretest score}}{\text{Maximum score} - \text{Pretest score}} \qquad (3)$$

The calculation results are interpreted using the normalized gain according to the Meltzer classification in Table 2.

Table 2. Gain Value Classification [23]

Normalized gain value	Interpretation
$g > 0.7$	High
$0.3 < g < 0.7$	Medium
$g < 0.3$	Low

After the N-Gain test is done, the inferential analysis is carried out. Inferential analysis was carried out by means of independent sample t-test, which is a comparative test of the differences between the two samples used. This test was conducted to determine the significance of the difference in the average self-efficacy and scientific communication skills of students in physics between the experimental class and the control class using the PASW 17.00 program. After the independent sample t-test was carried out, to test the effectiveness of the e-worksheet on the self-efficacy and scientific communication skills of physics students, it was carried out using the effect size formula [24]:

$$d = \frac{M_A - M_B}{[(Sd^2A + Sd^2B)/2]^{\frac{1}{2}}} \qquad (4)$$

Notes:

d : Effect Size

M_A : average Gain of experimental class

M_B: average gain of control class

Sd_A: standard deviation of the experimental class

Sd_B : standard deviation of control class

The criteria for the size of the effect size are classified in Table 3.

Table 3. Effect Size Category [24]

Effect Size	Category
$d < 0{,}2$	Small
$0{,}2 < d < 0{,}8$	Medium
$d > 0{,}8$	High

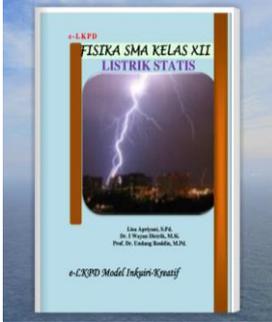## 3. RESULTS AND DISCUSSION

3.1 Preliminary Study

Preliminary study is the initial or preparation stage by collecting data about existing conditions as a comparison material for the product being developed [25]. The preliminary study step includes a needs analysis, namely conducting a study of the curriculum, analyzing the material, and conducting a literature review.

The results of the empirical study were carried out using a needs analysis questionnaire to 40 students of class XI SMA Negeri 5 Bandar Lampung and SMA Negeri 7 Bandar Lampung. The results obtained are 87% of students are less interested in physics lessons because of the use of teaching materials that are less interesting and materials that they think are too difficult. The obstacles experienced by these students make self-efficacy and scientific communication skills low. This is because teachers do not yet have media that can stimulate HOTS abilities in increasing students' self-efficacy and scientific communication skills.

3.2 Planning and Development

Table 4 describes the design of e-worksheet based on creative inquiry that was developed.

Table 4. Design of E-worksheet Based on Creative Inquiry

No	Description	Narration	Amount	Page
1	Cover	1. Title of e-worksheet is "Listrik Statis Fisika SMA Kelas XII" 2. There are pictures related to static electricity at the bottom of the title 3. The author is placed at the bottom of the image 4. There is an e-worksheet model in the lower right corner	1	i
2	Preface	In the preface contains: 1. The author's expression of gratitude 2. Acknowledgment 3. Place, month, and year of writing	1	ii

3	Instruction for use the worksheet	Contains instructions for using e-worksheet	1	iii
4	Table of content	In the table of contents, it is written in LK 1 to LK 3 which will be used regarding static electricity as a whole and accompanied by the pages	1	iv
5	LK 1	Contains objectives, materials, learning activities and bibliography on electric charge, field and electric force materials	17	1
6	LK 2	Contains objectives, materials, learning activities and bibliography on electric flux and Gauss Law	6	21

7	LK 3		Contains objectives, materials, learning activities and bibliography on potential and static electricity	8	27
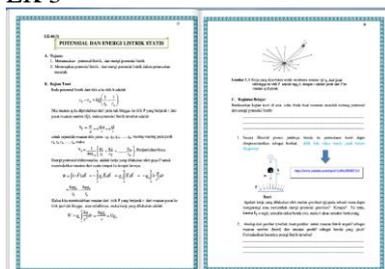
E-worksheet that has been designed and developed is then tested for validity by content validators and construct validators. The product validity test was carried out by 2 expert lecturers and 1 educational practitioner by giving an appropriate or inappropriate assessment. Content validity includes conformity with the curriculum used, conformity with the needs of students, conformity with learning syntax and suitability of the material used. While construct validity includes rationality of e-worksheet, suitability of images with letters, conformity with the model used and suitability of materials with developed e-worksheet.

Based on the results of expert and practitioner tests, the average content validity and construct validity was 80.00% with a suitable category for use with improvements. The data from the e-worksheet validity test results are shown in Table 5.

Table 5. Expert Test Percentage

No	Test Type	Expert Validator			Average	Qualification
		D1	D2	P1		
1	Content validity	50,00%	80,00%	100,00%	76,67%	Valid
2	Construct validity	80,00%	80,00%	90,00%	83,33%	Very Valid

Based on Table 5, the percentage of content or material validity is 76.67% with a valid category. Meanwhile, for construct validation, the percentage is above 80%, which is 83.33% with very valid qualifications. This indicates that the developed e-worksheet is feasible to use in terms of content or material aspects. E-worksheet based on creative inquiry that was developed was in accordance with the needs of students, such as the achievement of learning objectives, and the suitability of teaching materials with high school curriculum and materials. The learning materials in the e-worksheet fulfill the elements of creative inquiry and are equipped with elements of self-reflection that enable students to recognize their weaknesses and strengths in self-assessment and scientific communication skills.

In addition to being viewed from the aspect of content validity, the developed e-worksheet is also viewed from a construct perspective. Based on the results of the analysis of construct validity, it shows that the e-worksheet based on creative inquiry that was developed is feasible to use. Starting from the cover page, the images used are in line with the theme being studied or already describe the contents of the e-worksheet. Provision of regular page numbers, type and size of letters, writing titles, subtitles, and sentences are appropriate. The color combination presented and the space for placing images and videos in the e-worksheet are good. So that e-worksheet can be used and interesting for students. The form of pictures or illustrations of phenomena supports the concept of static electricity.

Illustration is one of the visual-based media that plays an important role in the learning process and has a function based on the results of Sakti's (2013) research that visualization can clarify student observations and contribute to increasing student

understanding [26]. The presence of pictures (phenomena) in learning activities will give a new nuance. It can be a stimulant or a stimulant during learning activities [27].

3.3   Field Test

The field test was conducted at SMA Negeri 1 Airnaningan, Class 12 MIA 1 as the control class and Class 12 MIA 2 as the experimental class. There are 34 students in each class. The results of student's responses to the e-worksheet based on creative inquiry can be seen in Table 6.

Table 6. Results of Student's Responses to E-worksheet Based on Creative Inquiry

No	Response	Percentage
1	Positive	94,44%
2	Negative	5,56%

Based on the table above, a positive response to the use of e-worksheet based on creative inquiry was obtained by 94.44%. This means that e-worksheet is well received by students.

The effectiveness of e-worksheet based on creative inquiry oriented HOTS in increasing self-efficacy and scientific communication skills was measured using N-gain value analysis.

Table 7. Results Test of N-gain Value Self Efficacy and Scientific Communication Skills

Aspect	Class	Pretest	Posttest	N-gain	Criteria
Self Efficacy	Experiment	2.37	3.97	0.64	medium
	control	2.19	3.52	0.46	medium
Scientific communication skills	Experiment	2.20	4.10	0.72	high
	control	2.29	3.25	0.35	medium

Based on the results of the analysis in Table 7, the percentage of N-gain in the experimental class on the aspect of self-efficacy is 64% and scientific communication skills is 72%. The N-gain self-efficacy score in this experimental class shows that the e-worksheet used in learning has a sufficient influence in increasing students' self-efficacy. Students' understanding of the material is not only fixed on one form of activity but in the many activities they get from the experiments contained in the e-worksheet. Thus the understanding of students' concepts will be deeper. These results are consistent with the results of Abdurrahman's (2016) study, teaching strategies that actively involve students in the learning process through an inquiry process using practical work are more likely to improve students' mastery of material than strategies that rely on more conventional techniques [28]. Likewise, the N-gain score of scientific communication skills in the experimental class shows that the e-worksheet used has a high influence in improving students' scientific communication skills. Improvements can be seen in each indicator of scientific communication skills assessed starting from the ability to explain, to represent in tables and graphs, as well as in preparing reports. This is also reinforced by the Ministry of National Education (2017) which states that the process of compiling a practicum report is one of the communication skills to convey the results of their findings to others in written form [29].

The next stage is the effect size test which is used to measure the effectiveness of e-worksheet on self-efficacy and scientific communication skills. The results of the effect size test are shown in Table 8.

Table 8. Result of Effect Size

	Grup	Mean	Std. Deviation	Effect Size	Note
Self-Efficacy	Experiment	0.64	0.176	1,19	High
	Control	0.46	0.112		
Scientific Communication Skills	Experiment	0.72	0.156	2,17	High
	Control	0.35	0.187		

Based on Table 8, the effect size value for self-efficacy is 1.19 with high criteria, so it can be concluded that the large effect of learning using e-worksheet based on creative inquiry to increase students' self-efficacy is high. While the effect size value for scientific communication skills is 2.17 with a high category. So it can be concluded that the learning effect of using e-worksheet based on creative inquiry to improve students' scientific communication skills is high. This is in line with the results of research by Anggraini et al. The high value of effect size also has an effect on increasing self-efficacy and student learning outcomes [30].

3.4 Dissemination

The preliminary research stage shows that it is necessary to develop an e-worksheet that can improve self-efficacy and scientific communication skills, so that an effective creative inquiry-based e-worksheet is developed to improve students' self-efficacy and scientific communication skills. The process of developing a creative inquiry-based e-worksheet product is carried out in the second stage, namely planning and development which is then validated by experts in terms of content and construct. The validation results which reach a score of 80% indicate that the e-worksheet is feasible to use. After being declared feasible, a field test was then conducted to see the practicality and effectiveness of the e-worksheet. From the results of the field test, it was obtained that the positive response of students to e-worksheet was 94.44% and the results of the n-gain and effect size test, each of which was in the high category to improve self-efficacy and scientific communication skills. Effect size can be used to determine variables that can be studied further. The chosen variable does not always have to be a variable that has a large or moderate effect size. Researchers can also choose variables with small effect sizes, for example if the research interest is in variables that moderate or mediate other variables [31].

The activity stages presented in the e-worksheet show an increase in activities that allow students to have high self-efficacy and scientific communication skills. The overall effectiveness assessment of the e-worksheet shows that the e-worksheet product developed has been effective based on the achievement of self-efficacy and scientific communication skills. The overall achievement of both practicality and effectiveness of the e-worksheet has been stated to be good. So, e-worksheets can be used widely.In addition to the research site, this e-worksheet was also used in a high school in Pringsewu with a positive response reaching 90%. And the practicality test of using e-worksheet is 86.67%.

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that E-worksheet based on creative inquiry using 3D Page flip oriented HOTS is declared valid to improve self-efficacy and scientific communication skills with a content validity percentage of 76.67% with valid criteria and a construct validation percentage of 83.33% with very valid criteria, declared practical to improve self-efficacy and scientific communication skills with a positive response of students to the practicality of e-worksheet by 94.44%, and declared effective for increasing self-efficacy and scientific

communication skills of learners with the value of N-gain self-efficacy is 0.77 in the high category and the N-gain value of scientific communication skills is 0.79 with the high category and the effect size for self-efficacy and scientific communication skills is 0.4 in the medium category and 1.42 in the high category.

REFERENCES

[1] D. Setiawan, T. Belawati, I. M. Sadjati, D. Andriani and B. A. Pribadi, Pengembangan Bahan Ajar, Tangerang Selatan: Universitas Terbuka, 2012.

[2] I. Lestari, Pengembangan Bahan Ajar Berbasis Kompetensi, Padang: Akademia, 2013.

[3] Kemendikbud, Konsep dan Implementasi Kurikulum 2013, Jakarta: Kementerian Pendidikan dan Kebudayaan, 2014.

[4] R. W. Dahar, Teori-Teori Belajar dan Pembelajaran, Jakarta: Erlangga, 2006.

[5] N. M. S. Nuyami, I. W. Suastra and I. W. Sadia, "Pengaruh Model Pembelajaran Kooperatif Tipe ThinkPair-Share Terhadap Self-Efficacy Siswa SMP Ditinjau Dari Gender," *EJournal Program Pascasarjana Universitas Pendidikan Ganesha Prodi IPA,* vol. 4, no. 1, 2014.

[6] K. Zulkosky, "Self Efficacy : A Concept Analysis," *In Journal Compilation,* vol. 44, no. 2, pp. 93-102, 2012.

[7] G. Caprara, C. Barbaranelli, P. Steca and P. Malone, "Teachers' self-efficacy beliefs as determinants of job satisfaction and students' academic achievement: A study at the school level," *Journal of School Psychology,* 2006.

[8] K. Dawson, C. Cavanaugh and A. Ritzhaupt, "Florida's EETT leveraging laptops initiative and its impact on teaching practices," *Journal of Research on Technology in Education,* vol. 41, no. 2, 2006.

[9] O. S. Levy, B. Eylon and Z. Scherz, "Teaching Communication Skills in Science : Tracing Teacher Change," *Teaching ang Teacher Education,* vol. 24, pp. 402-477, 2008.

[10] U. Samatowa, Samatowa, Usman, Bagaimana Membelajarkan IPA di SD, Jakarta: Direktorat Jenderal Pendidikan Tinggi, 2006.

[11] W. Harlen, "Evaluating inquiry-based science developments," *A paper commissioned by the National Research Council in Preparation for A Meeting on the Status of Evaluation of Inquiry- Based Science Education. Bristol,* 2004.

[12] S. D. Ozgur and Yilmaz A, "The Effect Of Inquiry-Based Learning On Gifted And Talented Students' Understanding Of Acidsbases Concepts And Motivation," *Journal Of Baltic Science Education,* 2017.

[13] M. Aulls and B. Shore, "Inquiry In Education: The Conceptual Foundation for Research as a Curricular Imperative," *Laurence erlbaum Associates. Authentic learning.,* 2008.

[14] D. Haury, "Teaching Science Through Inquiry," *Journal of Baltic Science Education,* vol. 16, no. 6, pp. 999-1008, 2002.

[15] Pusfarini, Abdurrahman and T. Jalmo, "Efektivitas LKPD Sains berorientasi Model Pembelajaran berbasis Masalah dalam Menumbuhkan Kecakapan Berpikir Kreatif," *Jurnal Pendidikan Progresif,* vol. 6, no. 1, p. 69, 2016.

[16] S. Ozgur and Yilmaz A, "The Effect Of Inquiry based Learning On Gifted And Talented Student's Understanding Of Acids bases Concepts And Motivation," *Journal Of Baltic Science Education,* vol. 16, no. 6, pp. 994-1008, 2017.

[17] Sugiyono, Metode Penelitian Kualitatif dan R&D, Bandung: Alfabeta, 2011.

[18] W. R. Borg and M. D. Gall, Educational Research: An Introduction, Fifth Edition, New York: Longman, 1983.

[19] R. J. Fraenkel, N. Wallen E and H. H. Hyun, How to Design and Evaluate Research in Education : Eight Edition, Mc Graw-Hill Companies,Inc, 2011.

[20] S. Arikunto, Prosedur Penelitian, Jakarta: Rineka Cipta, 2014.

[21] Sudijono, Metode Penelitian Kuantitatif Kualitatif, Bandung: Alfabeta, 2011.

[22] D. E. Meltzer, "The Relationship between Mathematics Preparation and Conceptual Learning Grains in Physics: A Possible "Hidden Variable" in Diagnostice Pretest Scores," *American Journal Physics,* vol. 70, no. 12, 2002.

[23] R. Hake, "Analyzing Change/Gain Scores," *www. physics. indiana. edu,* vol. 16, no. 7, 1999.

[24] R. R. Hake, "Relationship of Individual Student Normalized Learning Gains in Mechanics with Gender, High-School Physics, and Pretest Scores on Mathematics and Spatial Visualization," *www.physics.indiana.edu/~hake,* 2002.

[25] N. S. Sukmadinata, Metode Penelitian Pendidikan, Bandung: Remaja Rosadakarya, 2011.

[26] Sakti, Simple, Lexicalized Choice of Translation Timing for Simultaneous Speech Transalation, Nara Institute of Science and Technology, 2013.

[27] I. W. Adinata, N. Maharta and I. D. P. Nyeneng, "Pengembangan Komik Pembelajaran Fisika Berbasis Desain Grafis," *Pendidikan Fisika FKIP Unila,* 2015.

[28] A. Abdurrahman, "Pemanfaatan Science In Box dalam Pembelajaran Berbasis Inkuiri di SMP untuk Meningkatkan Penguasaan Konsep Fluida Statis," *Jurnal Ilmiah Pendidikan Fisika Al-Biruni,* vol. 5, no. 2, pp. 205-212, 2016.

[29] Depdiknas, Kurikulum SMA 2004: Pedoman Khusus Pengembangan Silabus dan Penilaian, Jakarta: Depdiknas, 2017.

[30] W. Anggraini and B. Hudiono, "Pemberian Umpan Balik (Feedback) Terhadap Hasil Belajar Dan Self-Efficacy Matematis Siswa Kelas VII SMP," *Jurnal Untan,* 2014.

[31] A. Santoso, "Studi Deskriptif Effect Size Penelitian-Penelitian Di Fakultas Psikologi Universitas Sanata Dharma," *Jurnal Penelitian,* vol. 14, no. 1, 2010.