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The 3rd Sriwijaya University Learning and Education International Conference

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The 3rd Sriwijaya University Learning and Education International Conference SULE-IC 2018

OCT 17-18, 2018 — PALEMBANG, INDONESIA

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PREFACE

The 3rd SULE_IC which stands for Sriwijaya University Learning and Education-International Conference is to provide and opportunity for academicians and professional from various education related field from all over the world to come together and learn from each other. This is the 3rd SULE_IC 2018, devoted to current research and theory as well as future perspectives on current global issue pertaining to learning and instruction in education, and that is why we choose the theme of the conference is "Learning and Education in 21th Century.

Furthermore, the additional goal is to provide a place for academicians and professionals with disciplinary interests related to education to meet and interact with members inside and outside their own particular disciplines.

The 3rd SULE-IC 2018 will bring together researchers, educators, students, and practitioners in the areas of Sciences, Applications and Technologies in Education from around the world.

Palembang, 20 October 2018

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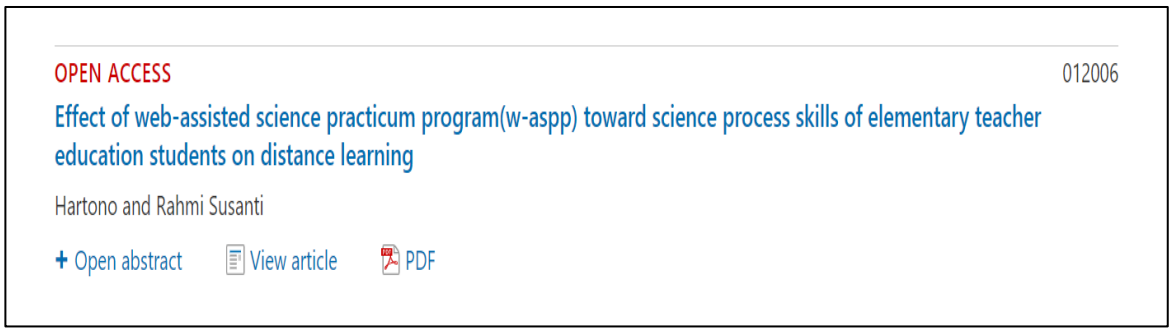

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Hartono and Rahmi Susanti

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Effect of web-assisted science practicum program(w-aspp) toward science process skills of elementary teacher education students on distance learning

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Abstract. This study aims to obtain information on the effect of web-assisted science practicum program (W-ASPP) to (1) the mastery of science process skills and (2) experimental group skills of *web* surfing. The research method used is quantitative with pretest-postest control group design. This research involving 60 students of Elementary Teacher Education (ETE). Collecting data with written test, performance test, real practicum journal and observation, online discussion response, student log on frequency, and questionnaire. Data analysis using SPSS 17 for windows program. The results showed that there was an increasing in the science process skills (SPS) student mastery of W-ASPP lecture participants compared to the regular lecture group of students ($p<0.025$). Further analysis used regression which result showed that ($r^2 = 0,39$) SPS mastery ability through practice test was caused by SPS mastery through written test and the rest ($r^2 = 0,61$) caused by other factor. SPS mastery through written examination is caused by the number of *log on* student frequency ($r^2= 0,91$) and the average score of response activity of *online* practice ($r^2 = 0,42$). Thus W-ASPP is declared effective in improving SPS of ETE students..

1. Introduction

The Distance Education Program (DEP) on Elementary Teacher Eductaion (ETE) has been implemented since the 2006/2007 academic year with a hybrid learning system, in which students are required to learn by utilizing various teaching materials such as print, audio/visual and network assisted, as well as face-to-face tutorials and online [1]. Distance Higher Education The ETE Undergraduate Program is one of the government's breakthroughs in accelerating the field of study teachers who have not earned bachelor [2].

Science Practicum is one of the subjects that was offered at in the third semester of the curricula of Elementary Teacher Education (ETE). Practicum activities are very important, among them to generate motivation to learn science, a vehicle to learn scientific approaches and support understanding of the material [3]. Practicum activities both in the laboratory and/or assisted by the web can improve science process skills (SPS) [2]. SPS is a bridge to convey new information to students. Therefore, SPS is very essential to be mastered by elementary school teachers.

SPS is a bridge to convey new information to students. Therefore, SPS is very essential to be mastered by elementary school teachers. Based on the results of preliminary research [4], the students' conception of science process skills is still not satisfactory. Lack of conception of SPS is thought to be difficult to repair without being provided with self study through web media that could be accessed in the area where students stay [2].

Designing web-assisted learning has been widely researched by researchers. The learning design they make contains exercises and solutions with the aim that students are more active and motivated to learn more outside the classroom [5,6,7]. Research on the relationship of computer simulation and science process skills has also been carried out by several researchers. They state that computer simulations can activate student science process skills [8, 9, 10]. Even suggested further use of computers for distance education laboratories [11**].**

W-ASPP activities are grouped into two things, namely online lab work and real practicum in the laboratory. Online practicum activities are grouped into five parts, namely orientation and pretest activities, online practicum activities, online discussions, online assessments, and online questionnaires. Furthermore, real practicum activities are carried out in a laboratory consisting of introduction and pretest, practicum and written assessment and performance [2].

The characteristics of W-ASPP are (1) students have information technology skills in terms of computer use in the form of Microsoft Office and the internet, (2) practicum oriented to science process skills (SPS) which are only carried out in real practicum activities and online activities, (3) online learning activities encourage students to always be able to renew and improve their abilities continuously, (4) in residential students do practical science activities in the laboratory, (5) students are required to demonstrate SPS through individual practicum tests [2].

The lecture program on web-assisted science labs in general can improve students' science process skills in written exams and practice exams. Therefore, the researchers wanted to find out more about the effect of the implementation of the Web-Assisted Science Practicum Program (W-ASPP) on (1) mastery of science process skills and (2) the skills of the experimental group to explore the web [2].

2. Research methods

This study is a quantitative research with pretest-posttest control group design. In this design, before the group was given a treatment given a pretest, then after the treatment was given a posttest (Table 1) [12]

Table 1. Pretest-posttest control group design

No	Groups	Pretest	Treatments	Posttest
Random	A (Experiment)	O	X1	O
Random	B (Control)	O	X2	O

Noted:X1 = Web-assisted science practicum with SPS orientation
X2= Science practicum with consortium version
O = Science process skill test

This study involved undergraduate students of Elementary Teacher Education with Distance Education (fourth semester). Sampling was conducted purposively with a total of 60 students (30 students were into the experimental class and the other was into the control class). Data collection techniques used written tests, performance tests, observations, and questionnaires. Furthermore, data were analyzed using SPSS 17 for Windows. The N-gain value is used to compare the increase in mastery of science process skills among groups. The program is effective if the mean N-gain is different significant between treatment and control groups and the mean N-gain of the treatment group is higher than the control group.

T-test was used to know the differences of mean among the groups was done by t-test (independent sample t-test). Decision making in the tests of normality, homogenity, and t-test is based on a comparison of the probability value (p)/significance (Sig.) With a confidence level of 5% ($\alpha = 0.05$). Further analysis using correlation coefficient (r), coefficient of determination (r^2) and regression equation.

3. Result and Discussion

The effectiveness of the application of the program toward student learning outcomes was shown by two main things, namely: (1) mastery of science process skills and (2) students' skills in the experimental group browsing the online practicum web.

3.1 Mastery of Science Process Skills

In mastery of science process skills, results of the t-test on the initial ability of science process skills in the written test and practical examination between the experimental group and the control group were the same/not significantly different. The ability of students in the written test and test of practical SPS of the experimental group was superior to the control group. This was indicated by the mean percent N-gain of SPS in the written test of experimental group was 73 while the control group was 20 (Figure 1) and the mean percent N-gain for the practical test of SPS experimental group was 59 while the control group was 19 (Figure 2). The differences in scores proved that the program is effective in improving student science process skills.

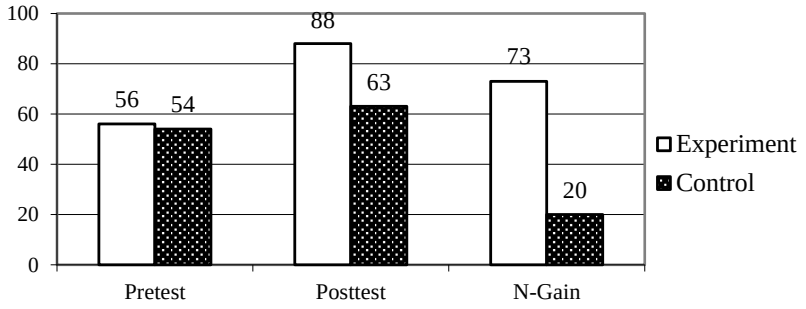

Figure 1. Comparison of student SPS written test between experiment and control groups

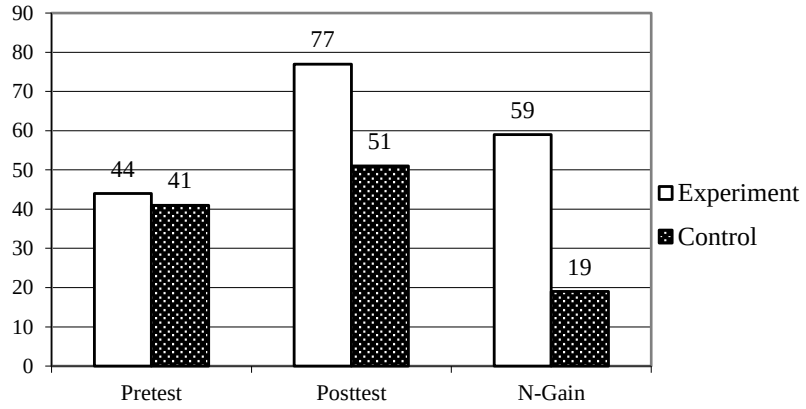

Figure 2: Comparison of student practical test between experimental dan control groups

Correlation between improvement of the ability of SPS from written and practical test was determined. The correlation coefficient (r) of the experimental group was 0.62 and the control group was 0.34. Based on the coefficient of determination (r^2) of the experimental group, it was 0.39. It means that the ability of SPS mastery through practical exams was caused by SPS mastery through written tests. The remaining was 0.61 due to external factors. Otherwise, the control group was 0.11. It means that the ability of SPS through practical tests was caused by the mastery of SPS through written tests, the remaining was 0.89 due to other factors (Table 2).

Table 2. Regression test results the influence of SPS written test (n-gain) against mastery of practical exams SPS

Groups	Regression Equation	F-Test and Decision	T-Test and Decision
Exp.	Y= -111,63 + 2,322X	F_{cal} = 17,687;Sig: 0,000<0,05 Regres. Equation : Significant	t_{cal}= 4,206Sig: 0,000<0,025 Regres Coef: Significant
Cont.	Y= 7,134 + 0,638X	F_{cal} = 3,572;Sig: 0,069>0,05 Regres.Equation not Significant	t_{cal}= 1,890;Sig: 0,069>0,025 Regres. Coef : not Significant

Regression analysis results in Table 2 show that the increase in the ability of SPS mastery obtained by the written test has a significant effect on the ability of SPS mastery obtained from the practical test (Sig.<0.025) only for the W-ASPP group. Regression equation group W-ASPP Y = -111.63 + 2.322X (Y = practicum test score and X = written test score), then -111.632 means there is no additional written test score, the indirect practicum test score decreases by - 111.632 and 2.322 this means that each additional written test score will result in an indirect practicum test score of 2,322.

3. 2 The skills of the student experiment group exploring the web

Students' skills in exploring the web were measured from several activities, namely: (1) frequency of students log on web, (2) response to online practicum activities, (3) online discussion responses, (4) online assessments, and (5) online questionnaire responses.

3.2.1 The frequency of students logging on the web

If the log on frequency is set as an independent variable and an increase in N-gain, the ability to master SPS from the written test as a dependent variable is then sought for correlation. The correlation results indicate that there is a very strong correlation for the W-ASPP group. The correlation coefficient (r) is 0.954. The coefficient of determination is 0.91. Based on the determination coefficient, it can be determined that 0.91 SPS mastery ability through written tests is caused by the frequency of log on students, and the remaining 0.9 is due to other factors. Regression analysis results Table 3 shows that the frequency of log on students has a significant effect on the ability of SPS obtained from written examinations. According to[13] that students who often log on the web have learning outcomes above average, but cannot monitor whether the learning outcomes are due to the length of time students access the web.

Table 3. Regression test results from frequency effects log on to mastery of SPSS written test

Groups	Regression Equation	F-Test and Decision	T-Test and Decision
W-ASPP	Y= 68,965 + 0,993X	F_{cal} = 285,879;Sig: 0,000<0,05 Regres. Equation : Significant	t_{cal}= 16,908;Sig: 0,000<0,025 Regres Coef : Significant

3.2.2. Response to online practicum activities

If the average frequency of response scores online practicum activities are determined as independent variables and an increase in N-gain, the mastery ability of SPS obtained from the written test is determined as the dependent variable which is then sought for correlation. This shows that there is a very strong correlation for the W-ASPP group. The correlation coefficient (r) is 0.758. The determination coefficient (r^2) is 0.58. Based on the coefficient of determination (r^2) it was determined that 0.42 SPS mastery ability through written tests was caused by the average score of online practicum response scores, the remaining 0.58 was caused by other factors. Regression analysis results Table 4 shows that the average magnitude of online practice activity response scores significantly influence the ability to master the concept of SPS obtained from written examinations (Sig.<0.025).

Table 4. Result of regression test on the effect of online practicum activity response scores towards the mastery of SPSS written test

Groups	Regression Equation	F-Test and Decision	T-Test and Decision
W-ASPP	Y= 55,862 + 0,234X	F_{cal} = 37,830;Sig: 0,000<0,05 Regres Equation : Significant	t_{cal}= 6,151;Sig: 0,000<0,025 Regres Coef : Significant

3.2.3 Response to online discussion

Based on online discussions, the lowest student response is about communication skills. The topic of this discussion asked students to explain how to teach low grade students in making bar graphs. Only a small number of students answered correctly. Allegedly this inaccuracy is the background of teaching experience in different classes in elementary school, even some students no longer teach in class because they answer the principal. Online discussion material should contain themes that are appropriate to students 'needs and relate to students' real experiences. This corresponds to androgogy teaching so that topics that correspond to student experience will get a good response from students [14]. The problem related to information technology is the difficulty of sending online discussions because of the small bandwidth in the district cafe. However, some students can complete it on campus (residential period).

3.2.4 Online assessment

Online assessment is a vehicle for training students in answering questions of SPS. SPS questions consisting of 27 questions were uploaded to the Moodle program and this program will randomize the order of questions and answer options every time this question is opened by students. Every time a student opens a question it will be recorded and if the student does the exercise questions from one time they will get a fine of every question of 0.1. Online assessment media is one of the reliable media to assess student activity. The weakness of online assessments is that bias cannot be avoided if students ask for help from others in working on online assessment questions

3.2.5 Response of online questionnaire

Online questionnaires capture student opinions on online practicum activities. Students' opinions on online lab work are as follows. In general, students understand online lab topics, but after being asked in more detail on the topic of practicum they answer the least understood about calipers. Furthermore, students stated that each practicum topic had almost the same level of difficulty. For online discussions, students stated that in general students understood discussion questions, but more than half of students had difficulty sending answers to discussions. More than half of students have difficulty answering online assessment questions and more than 70% of students have no difficulty answering questions online. 90% of students believed that the practicum material helped them in

answering online questions and 76% of students had no difficulties with existing IT skills. The opinion of students in general towards the science practicum web is very good (71%) and good (29%).

The advantages of W-ASPP are facilitating the students by students by online practicum activities, which enable students to train themselves independently through activities that respond to practicum, discussions, and assessments related to science process skills. Online practicum activities are carried out before a real practicum. Which is the main activity, which allows students to demonstrate the performance of their process skills.

4. Conclusion

The Web-Assisted Science Practicum Program (W-ASPP) is effective in (a) improving science process skills, (b) increasing student activity through online practicum, (c) improving skills in compiling real practicum journals, (d) basic scientific work skills, and (e) improving student ICT skills. Science process skills are provided through various activities in online and real labs in the laboratory. Student activity is measured through various activities in online labs, for example the frequency of students logging on the web. The skills to compile a journal result from the practicum will show students' expertise in practicing, processing data, making conclusions and reporting it. Journal of practicum results is collected on the same day. The online practicum program indirectly gives students access to ICT.

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