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Blended learning based on schoology: Effort of improvement learning outcome and practicum chance in vocational high school

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Abstract: The aims of this study were to determine: (1) the differences in learning outcome between Blended Learning based on Schoology and Problem-Based Learning, (2) the differences in learning outcome between students with prior knowledge of high, medium, and low, and (3) the interaction between Blended Learning based on Schoology and prior knowledge to the learning outcome. This type research was quasi-experimental with research subjects as many as 64 students were determined by random sampling assignment. The data collection technique used multiple-choice tests. The obtained data were analyzed by two-way ANOVA. The results of this study revealed that: (1) there was significant differences in learning outcome between Blended Learning based on Schoology and Problem-Based Learning (sig $p = 0.000 < \alpha = 0.05$), (2) there were significant differences in learning outcome between students with high, medium, and low prior knowledge (sig $p = 0.000 < \alpha = 0.05$), and (3) there was no interaction between Blended Learning based on Schoology and prior knowledge to the learning outcome (sig $p = 0.196 > \alpha = 0.05$).

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PUBLIC INTEREST STATEMENT

In 21st century, the technology has become wider and sophisticated. One of the most the significant progress of time in technology is internet and social media. Social media has become daily human activities to interact each other in virtual world using internet. This technology effect is also entering into education. Both teachers and students are now familiar with internet and social media. Facebook is one of the most popular social media, which has 1.59 billion users in 2016. By utilizing the concepts and fame of Facebook, appears a variety of online learning application that adopts social media in doing online learning, one of the example is Schoology. Students today are more interested in playing in social media and use gadgets than read a book; so based on that by applying online learning outside of school using Schoology similar to Facebook will keep students interested and enthusiasm for learning. Theoretical lessons can be given outside of school hours using Schoology and replace the theoretical lessons with the practicum chance.

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1. Introduction

Learning is a process of humanism and operationalization of education. Kegan (in Illeris, 2009, p. 43) says that there are two models of learning, namely informative learning that allows people to learn the appropriate development of their mental and transformative learning, the learning process that changes the mental of people.

Post-secondary education in Indonesia accommodates three institutions, namely Senior High School (SMA), Vocational High School (SMK), and Madrasah Aliyah (MA). The priority of SMK is to make the graduates to be ready to work in industry, entrepreneurship, and creating job fields. SMK becomes the Indonesia's largest technician provider. The allocation of the lessons is more in practice than theory.

The beginning of 2013/2014 school year, Curriculum 2013 is applied gradually to all levels of education in Indonesia, including SMK (Sudjimat, 2014, p. 24). Curriculum 2013 uses a scientific approach using inquiry method as follows: observing, asking, exploring, associating, and communicating. It can be seen on the syllabus of Curriculum 2013, which uses a scientific approach toward the learning process that it tends to be more centered on the student.

The learning model of inquiry method is applied to vocational school with a basis procedure in the form of services is the Problem-Based Learning. Problem-Based Learning is a learning model that provides scenarios for students to solve problems and find solutions. Problem-Based Learning does not just answer the problem scenario, but also boost knowledge for the students while trying to answer the given scenario of teachers (Wood, 2003, p. 328).

Based on the preliminary study, it was found that the model of Problem-Based Learning is not enough to overcome the problems existing in SMK 3 Singaraja on productive subjects. Teachers of Light Vehicle Electrical Maintenance Subject class XI Light Vehicle Technique (TKR) had trouble regarding to the time allotment; lack of time to give to the student practicum was the problem of it. Based on the multiple-choice pretest given in class XI TKR 1, it obtained 33.32 as the mean of students' cognitive prior knowledge on Light Vehicle Electrical Maintenance Subject. It indicated that the student prior knowledge was minimal; therefore, it shall be given more understanding on the theory, thus the students can achieved the completeness criteria (KKM) which is 75. The minimal prior knowledge made the teacher increase the meetings to be 70% for the theory and only 30% for practicum. Another problem was that the limited practicum materials. Engine stand on these subjects was only available three units, so that an average of one-unit engine stand was used by 10 students. Those made the lack of practical experience to each student because the amount of practice was not commensurate with the number of students.

The learning process with more theory made students become bored. Students shall be more active to carry out practical activities in the productive lesson but just passively sitting on the bench. Practicum is very important for students, through practicum students have the opportunity to explore and apply the theory learned. Practicum is more considered important, even given a practicum in a very long time and more than a theory in some countries (Özder, Isiktas, İskifoglu, & Erdogan, 2014, p. 1).

Directorate of SMK Indonesia issues a general policy that SMK must develop 70% of electronic-based learning (Sjukur, 2012, p. 369). The fulfillment of the target on the Curriculum in 2013 one of them by utilizing IT (Information Technology) by means of the internet. Sixth most Internet users in the world are occupied by Indonesia (Tekno.kompas.com, 2014). Internet has penetrated the world

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of education, ranging from easy access to sources of knowledge through the search engine Google, until the rise of web-based educational applications like Schoology. Implementation of inquiry learning methods in the classroom in fact had many problems, hence the technological advances can be used as an alternative to overcome the problems (Edelson, Gordin, & Pea, 1999, p. 391).

Blended Learning based on Schoology can be a solution to overcome the learning process that requires a lot of theories. Blended Learning based on Schoology is a learning that combines face-to-face learning in the classroom and online learning using Schoology application outside of school hours. Students who used Blended Learning based on Schoology get more additional theories outside school hours individually, so that the face-to-face meetings to provide the theoretical material can be reduced and replaced with practicum to the student.

Thorne (2003, p. 2) states that Blended Learning gives an opportunity to integrate the innovative and technological advances in online learning with the interaction and participation toward traditional learning. Blended Learning is a learning that combines the technology and traditional instructor-led training in the room (Bersin, 2004, p. 56).

Blended Learning has four characteristics, namely: (1) learning which combines technology; (2) combination of face-to-face learning, independent, and online; (3) the combination of effective learning, and (4) teachers and parents as facilitators and supporters (Husamah, 2014, p. 16).

Blended Learning takes on conditions such as learning that is not only centered to face-to-face learning but also adds the time allotment of the subjects with facilities cyberspace, to facilitate the communication process fast and non-stop between teachers and students, teachers and students as learners, and helping acceleration of the process of teaching with additional material from a distance.

Blended Learning makes users more easily to understand the theory and transfer theory into the practicum (Demirer & Sahin, 2013, p. 518). Blended Learning makes students become better prepared to follow the lessons in class and increases performance in taking the test (Garnham & Kaleta, 2002, p. 1).

Schoology is a free web-based education application which allows teachers to give lessons to students digitally. Schoology is adopting Facebook as an interface and feature for ease of use (Manning et al., 2011, p. 26). Students simply access www.schoology.com on the computer or download Schoology at PlayStore or Appstore on smartphone to use this application.

Schoology implements a Learning Management System (LMS). LMS is a management system that allows teachers to provide teaching materials, organize the learning process, and evaluate the learning process (Rahman, Ghazali, & Ismail, 2010, p. 75).

Modernization is needed for future learning (Kettanurak, Ramamurthy, & Haseman, 2001, p. 541). Interactive multimedia such as Schoology can improve students' learning experiences. Interactive multimedia can improve troubleshooting performance in an electrical subject (Mayer, Dow, & Mayer, 2003, p. 806).

Amiroh (2013) conveys Edmodo is a Facebook version of school because the display is very similar to Facebook, as well as social networking, in Edmodo also can make the online learning. Edmodo only supports quizzes, assignments, and polls in the learning process, in contrast to Schoology which is supporting quizzes, tests, discussions, and assignments. Edmodo cannot accommodate a question bank, send messages, and record students' attendance as in Schoology. Moodle is different from Schoology and Edmodo, Moodle does not adopt social media, but it is to apply the full LMS. The nature of Moodle is open source so that teachers can develop online classes as needed, this makes Moodle identical to blog on the website. Moodle has no analytic features such as Schoology, so that

Table 1. Differences between schoology, moodle, and edmodo			
Compare systems	**Schoology**	**Moodle**	**Edmodo**
Architecture			
Learning management system (LMS)	√	√	X
100% Cloud-based service	√	X	√
Social networking interface	√	X	√
Instructional tools			
Organizable lessons	√	√	X
Groups/learning communities	√	X	√
Threaded discussion boards	√	√	X
Micro-blogging	√	X	√
Content migration & imports	√	√	√
Administrative tools			
Authentication (SSO)	√	√	X
User creation & course enrollments	√	√	X
Customized look & feel	√	√	X
Custom roles, permissions, settings	√	√	X
Google apps account provisioning	√	√	X

Source: Amiroh (2013).

student progress cannot be monitored. Schoology concludes not much difference from the Moodle and Edmodo, but Schoology has advantages that are not found in Moodle and Edmodo.

Schoology had received the title as the best educational apps in 2013, 2014, and 2015 by the CODiE Awards. Table 1 shows a comparison between Schoology, Moodle, and Edmodo.

The low prior knowledge of students becomes a reason how importance Blended Learning based on Schoology applied to give the theory as much as can without neglects the practicum. Prior knowledge is considered as the sufficient knowledge of students before the course. Prior knowledge shows the readiness of student learning with a direct impact on learning outcomes (Tobias, 1994, p. 37).

The learning outcome is a change in a person's behavior in cognitive, affective, and psychomotor ability in a situation that caused by the experience gained repeatedly (Hamalik, 2003, p. 48). Learning outcome becomes the level of mental development to the next stage which is much better than before by experiencing the learning process for students, while learning outcome means that completion of time given by teachers.

Sjukur (2012) and Sahin (2010) found that Blended Learning had a significant effect on vocational school students' learning ability. Blended Learning shown to improve learning outcome and skills of vocational students in the classroom than students who used the face to face learning.

Based on the theory and relevant research results, the aims of this research were: (1) determining significant differences in learning outcome between students with Blended Learning based on Schoology and students with Problem-Based Learning; (2) determining significant differences in learning outcome between students with high prior knowledge, medium prior knowledge, and low prior knowledge, and (3) the interaction between Blended Learning based on Schoology and the prior knowledge of the students' learning outcome.

2. Methodology

This study is a quasi-experimental research. The design used the nonequivalent control group design. Subjects in the study were 64 students. Thirty students were from class XI TKR 1 and 34 students were fromclass XI TKR 2. Grading treatment that uses Blended Learning based on Schoology was done by Random Assignment Sampling technique. Class XI TKR 1 was elected to be treatment class and the class XI TKR 2 as a nontreatment class by lottering both of these classes.

The instrument of this study used a test. The test consisted of 40 multiple-choice items. The validity of the instrument included the contents of validation and construct of validation. Content validation was given to the two experts, and the test could be used after the revision. Construct validation was given to class XII TKR SMK 3 Singaraja by the number of 33 students (r table = 0.344). The entire test items werw declared valid because it had r count > r table. The test reliability criteria were very high (Cronbach's alpha = 0.961).

The data obtained from the study; (1) pre-test score of students's prior knowledge in treatment class before getting treatment, (2) pre-test score of students's prior knowledge in non-treatment class, (3) post-test score of students's learning outcome in treatment class with model Blended Learning based on Schoology, and (4) the post-test score of students's learning outcome in non-treatment class with model Problem-Based learning.

The data analysis of this study used: (1) test for normality with One Sample Kolmogorov-Smirnov method; (2) test of homogeneity with Levene Test method, and (3) hypothesis test by using Two Way ANOVA.

3. Result

Normality test result shown treatment class had a significance of 0.848 and 0.295 for non-treatment class, so the normal spread of data concluded. Homogeneity test shown a significance value of 0.118, it can be concluded that distribution data was homogeneous. Table 2 presents the results of Two Way ANOVA test with α = 0.05.

First hypothesis accepted (sig p = 0.000 < α = 0.05). There were significant differences in learning outcome between Blended Learning based on Schoology and Problem-Based Learning.

Second hypothesis accepted (sig p = 0.000 < α = 0.05). There was significant differences in learning outcome between student with high prior knowledge, medium prior knowledge, and low prior knowledge.

Third hypothesis rejected (sig p = 0.196 > α = 0.05). There was no interaction between Blended Learning based on Schoology and prior knowledge to the students's learning outcome.

Table 2. Result of hypothesis test

Dependent variable:Learning_outcome

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	4,535.261ᵃ	5	907.052	61.851	0.000
Intercept	368,844.399	1	368,844.399	25,151.072	0.000
Model	641.576	1	641.576	43.748	0.000
Prior_knowledge	3,138.450	2	1,569.225	107.004	0.000
Model × Prior_knowledge	49.235	2	24.618	1.679	0.196
Error	850.579	58	14.665		
Total	386,306.250	64			
Corrected total	5,385.840	63			

a. R^2 = 0.842 (Adjusted R^2 = 0.828)

Source: Data processed.

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Table 3. Learning outcome score statistics				
Variable	**Mean**	**Median**	**Minimum**	**Maximum**
Learning outcome of treatment class	81.9167	82.50	70.00	95.00
Learning outcome of non-treatment class	72.9412	72.50	60.00	90.00

Source: Data processed.

4. Disscussion

4.1. Effect of blended learning based on schoology to the learning outcome

Based on the results obtained in the first hypothesis stated that there were significant differences learning outcome among students with Blended Learning based on Schoology and students with Problem-Based Learning. Table 3 displayed the score differences in student learning outcome between treatment class and non-treatment class.

Blended Learning was proven to improve learning outcome better than Probem Based Learning. Blended Learning based on Schoology was able to increase the activity of students outside school hours to explore the material individually and independently. Students could follow the online learning on Schoology using a laptop, personal computer, or smartphone. Blended Learning based on Schoology was also able to increase interaction associated with learning between peers outside school; this was proven from the increase in group learning and discussion among peers outside of school to learn together in Schoology. The best aspect of combining classroom study and learning on Schoology was to make mastery of concepts students increased due to the material obtained from various sources. As a consiquence the ability of students in the classroom increased.

This was supported by the theory proposed by Husamah (2014, p. 226) revealed that: (1) Blended Learning was able to make the development of students' learning process better than the models of face to face learning; (2) Blended Learning was able to provide practical and realistic opportunities in independent study, useful, and continued, and (3) flexible toward schedules for students through the incorporation of the best aspects of face-to-face and online learning. Face to face involved students in interactive experiences, and online subjects was able to provide students with rich multimedia content knowledge anytime and anywhere.

Research conducted at the Hacettepe University Turkey (Akkoyunlu & Soylu, 2008, p. 188) found that Blended Learning was able to improve the provision and development of more theoretical material to students. Students gave positive feedbacks and greatly appreciated to the learning process by using Blended Learning.

The results of this study were supported by the findings of Novitayati (2013, p. 15) that there were significant differences between students with models of Blended Learning and face-to-face learning to the learning outcome of SMK 3 Malang students with significance value of $0.047 < \alpha = 0.05$. Blended Learning could make the time allotment for learning process become shorter. Blended Learning was highly appropriate for learning that aims to make students more active. Sahin (2010, p. 99) found that vocational students with Blended Learning had 84.1071 asa mean score on the final exam. It was better than non-treatment which had 72.1429 as the average. Blended Learning was proven to improve the performance of vocational students in the classroom. In line with study found Sjukur (2012, p. 375), vocational students that used Blended Learning had 77.58 as the average learning outcome. Meanwhile for the class which used face-to-face learning had 60.32 as the average learning outcome.

Rozaq (2015, p. 63) stated that the model of Problem-Based Learning was better than conventional learning model in Light Vehicle Electrical Maintenance Subject. Students with Problem-Based Learning had 86.33 as the average, whereas students with conventional learning outcome study

Table 4. Prior knowledge range score					
Category	**Mean**	**Median**	**Minimum**	**Maximum**	**Ammount of student**
High	88.2353	87.5	82.5	95	17
Medium	78.6111	80	67.5	85	18
Low	69.7414	70	60	85	29
				Total	64

Source: Data processed.

had 74.83 as the average. The results of this study could renew Rozaq findings because it compared the model of Problem-Based Learning with a more modern learning model, that was Blended Learning based on Schoology. Students with Blended Learning based on Schoology produced better average learning outcome than the average of student's learning outcome with Problem-Based Learning.

This description proved to give a lot of theoretical material to produce a satisfactory learning outcome without reducing the chance of practicum students, it can use the model-based Blended Learning Schoology.

4.2. The effect of prior knowledge to the learning outcome

Based on the results of the second hypothesis was obtained that there were significant differences in learning outcome between students with high prior knowledge, students with medium prior knowledge, and students with low prior knowledge. Table 4 display the range interval prior knowledge categories of treatment and non-treatment class.

Students with high prior knowledge had rated highest learning outcome, students with medium prior knowledge had medium learning outcome, and students with low prior knowledge had the lowest learning outcome. Students who had a higher prior knowledge could learn the material more quickly, due to prior knowledge that was more adequate than students with lower prior knowledge. Students with lower prior knowledge had minimum knowledge, so that students will master the material more slowly.

This finding was in accordance with the theory of Gultom and Silitonga (2009, p. 71) that prior knowledge of the students will affect the students's learning outcomes. Students who had a high prior knowledge of background knowledge will be more receptive to the material that being taught by the teacher. Students who had the a good background knowledge would be easier to accomplish its task consistently. Winkel (1991, p. 80) argues that the prior knowledge to be a bridge towards the beginning of the end result ability of the students. Each learning process is centered and started from the beginning of the prior knowledge of the students to be developed into new capability. The learning experience of students in the past played an important role in learning new concepts.

These results are supported by the findings of Margana (2010, pp. 93–94) that there was significant diferences between student with prior knowledge of high, medium, and low ($F_b = 83.227 > F_{table} = 3.00$). Students who had a high prior knowledge had rated higher learning outcome, amounting to 78.84, students with medium prior knowledge had 69.55 as the average learning outcome, and students with the low prior knowledge had 59.78 a mean result.

4.3. The effect of blended learning based on schoology and prior knowledge to the learning outcome

The result showed that the influence of Blended Learning models based on Schoology to the learning outcome proved not to rely on prior knowledge that students had. Blended Learning based on Schoology could improve the overall students' learning outcome in all categories of prior knowledge. All students with variety of characteristics of the prior knowledge could implement Blended Learning

based on Schoology to improve learning outcome. This was supported by a statement Idris (2015, p. 146) that Blended Learning is able to adjust various characteristics of the prior knowledge of students, so it is very effective for use in all conditions prior knowledge.

Widhiarso (2011, p. 8) described that no interaction indicates the effectivenes of learning model to the learning outcome do not depend on prior knowledge of the students. A treatment class and non-treatment class are together have increased the learning outcome across all categories of prior knowledge. Blended Learning based on Schoology inferred more effective than the Problem-Based Learning for the entire student learning outcomes using Blended Learning on the various categories of ability soared higher than student learning outcomes using a Problem-Based Learning on all of the abilities at first.

The Figure 1 shown that learning models did not interact with prior knowledge on learning outcomes. The Line of Figure 1 indicated the parallel line and it did not intersect, it could be concluded there was no interaction for learning outcome within the line pattern of learning model and the prior knowledge were only the same.

The findings Idris (2015, p. 146) and Herawati (2013, p. 41) can support the results of this study because both have the result that there is no interaction between the learning model and the initial capabilities of the learning outcomes of students.

These results differ from the findings Sjukur (2012, p. 376) that there is an interaction between the Blended Learning and learning motivation on learning outcomes of vocational students. The big difference in the results due to the different variables. If Sjukur examines student's motivation, this study examines the initial capabilities of the students.

Figure 1. Interaction between learning model and prior knowledge.

Source: Data processed.

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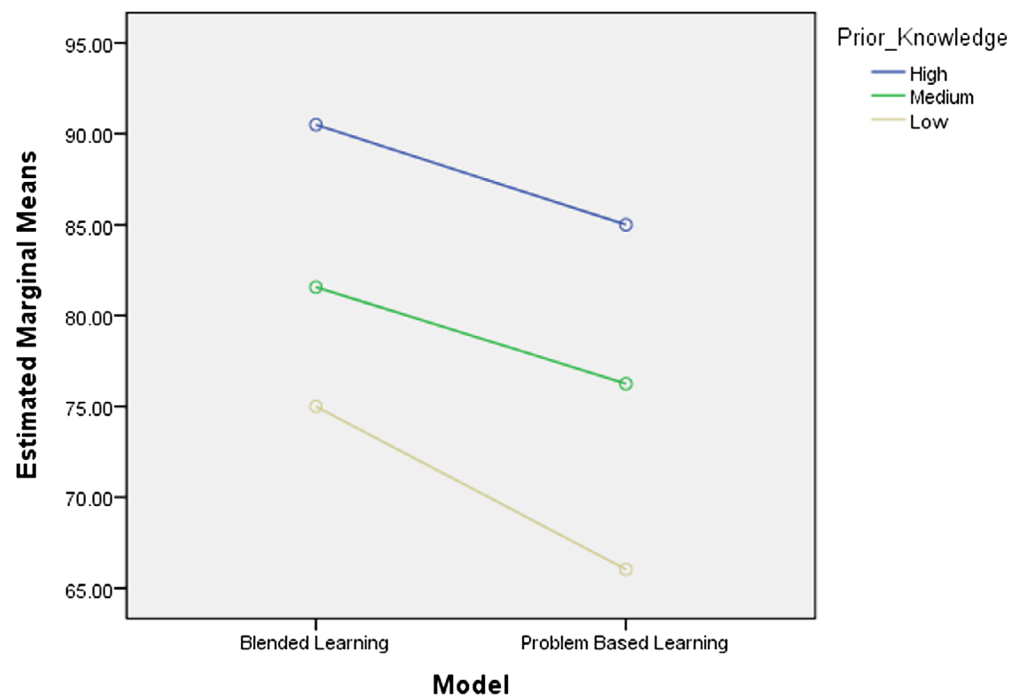
5. Conclusions and implications

5.1. Conclusions
The conclusion of the study were (1) there was a significant difference in learning outcome between students with Blended Learning based on Schoology model and students with Problem-Based Learning model (sig $p = 0.000 < \alpha = 0.05$), (2) there were significant differences in learning outcome between students who had high prior knowledge, students who had medium prior knowledge, and students who had low prior knowledge (sig $p = 0.000 < \alpha = 0.05$), and (3) there was no interaction between the learning model and prior knowledge to the student learning outcome (sig $p = 0.196 > \alpha = 0.05$).

5.2. Implications
Suggestions put forward are: (1) the Principal of vocational high school is expected to implement Blended Learning based on Schoology throughout all programs of the study in school to increase students' opportunities to implement practical; (2) the teacher can use Blended Learning based on Schoology as an alternative model of learning that can provide additional theoretical material outside school period; therefore, the face to face meetings to give the theory can be reduced and replaced with practicum; (3) students are expected to actively search for various sources of independent study outside school period and do not depend on the teacher entirely to increase their knowledge, and (4) further researchers can compare Blended learning model with others modern cooperative learning.

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