INTEGRATING CHARACTER EDUCATION ON PHYSICS COURSES WITH SCHOOLOGY-BASED E-LEARNING

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ABSTRACT

Aim/Purpose	This study intends to find out the difference between the use of Schoology-based e-learning and conventional learning by integrating character education in the learning process
Background	E-learning has a high contribution to change learning process positively, but it is a big challenge to conduct character education through e-learning, because of the reduced intensity of face-to-face with lecturers as the primary role model.
Methodology	The research sample consisted of 55 students of Electrical Engineering Faculty of Engineering, Universitas Muria Kudus. This study involved two variables: the experimental variable and the dependent variable. Experimental variables are treatment variables for the experimental class, namely physics learning through Schoology-based e-learning, and treatment variables for the control class used as a comparison, namely, conventional learning. The dependent variable is *ANEKA*-based character education. Indicators of *ANEKA* character values are integrated into the learning process and are measured using a Likert scale, which is given at the beginning and end of learning in the control and experimental classes. The normality testing use the Kolmogorov-Smirnov method; the homogeneity test use Levene's test; and hypotheses testing use F-ANOVA test and paired samples t-test.
Contribution	Contributions of this study are character education for students that could be done through e-learning by integrating character value (such as *ANEKA*) into the way they learn.
Findings	The results of the study show the student learning outcomes of Schoology-based e-learning platform users by 16% higher compared to conventional learning. The character values of students using e-learning also higher 20% compared to conventional learning. So it can be said that learning physics by using

	Schoology-based e-learning, which is integrated with *ANEKA*-based character education, can improve character values and student learning outcomes.
Recommendations for Practitioners	Findings from this research can convince the lecturer to integrate character values of *ANEKA* to their subject through e-learning
Recommendation for Researchers	For researchers, it is necessary to develop more scope including the use of other subjects and other study program students as respondents in the further study
Impact on Society	*ANEKA* character values could be integrated into the learning process, which can improve students' attitudes in their daily life
Future Research	Research on practicality and effectiveness in developing Schoology-based e-learning in other courses by integrating character values
Keywords	*ANEKA*, e-learning, physics, character education, Schoology

INTRODUCTION

The information technology revolution causes a fast expansion on every side of the modern world and becomes the most critical need in the development of learning media for schools, universities, and other educational institutions. The given benefit can improve learning and teaching effectivity and also handle the increasing demand for education and training (AlQahtani & Higgins, 2013). The one form of development of information technology for learning media that has been implemented in education is e-learning (Aminoto & Pathoni, 2014). In its growth, e-learning is used by most of the educational institutions around the world; as stated by Basori (2013), in the United States e-learning has been used by almost 90% for every education level which has more than 10.000 students. E-learning is an innovation that has a significant contribution for a change of the education process. The material in the courses can be visualized in a more dynamic and interactive format and form, so the student will be more motivated to become further involved in the learning process. One of the platforms that can be used as interactive learning media is Schoology (Aminoto & Pathoni, 2014).

A study that was conducted in 2008 by the National Center for Educational Statistics (NCES) found that the main factors that influence higher education institutions to offer online courses consists of fulfillment for flexible student meeting schedule (68%), provision of access to university for students (67%), availability of more course creation (46%), and prospecting for increasing student enrollment (45%) (Parsad, Lewis, & Tice, 2008). Variation of student-teacher interaction always happens from one classroom to another classroom. The emotional relationship, Student-Teacher involvement in a learning session, and classroom performance or academic achievement are significant to be investigated (Reyes, Brackett, Rivers, White, & Salovey, 2012). The learning process can be conducted everywhere and every time, with learning from the internet (e-learning) becoming an integral part of education. E-learning is an effort for giving class instruction and study material in new media that develop the virtual learning era, distance learning, learning management system, content management system, and learning content management (Evale, 2017).

Character education is a conscious effort from the teacher to teach character value to students. The government through the Ministry of National Education proclaimed the implementation of character education for every education level starting from elementary school through higher education because character gives a positive impact on the future (Kemendiknas, 2010). The concept of *ANEKA* was initially introduced in education and training for civil servants candidate in Indonesia. This activity is an absolute requirement that must be taken by the candidate for civil service to be appointed as a civil servant. After being completed, the fundamental of *ANEKA* values can be actualized earnestly by the civil servants of the Republic of Indonesia at the place of their workplace. The term *ANEKA* in *ANEKA* evaluation model is short for Akuntabilitas (in Indonesian) or Accountability

(in English), Nasionalisme (in Indonesian) or Nationalism (in English), Etika Publik (in Indonesian) or Public Ethics (in English), Komitmen Mutu (in Indonesian) or Quality Commitment (in English), Anti Korupsi (in Indonesian) or Anti-Corruption (in English) (Divayana et.al., 2018).

Science is considered a foundation of a modern technology breakthrough that has been developed. Low academic achievement in physics can be associated with many factors, of which the teacher strategy itself has been considered an essential factor. It implies that the mastery in physics concept could not be achieved without using teaching materials. Physics study without material is certainly a cause of poor academic achievement (Oladejo, Olosunde, Ojebisi, & Isola, 2011). Academic achievement or learning achievement is determined mainly by a training strategy. The visualization trend in the education world is reflected in a change in the learning process to e-learning. Smart Education means providing e-learning programs to fulfill needs and interest of students, teachers, and parents; on the other side Smart Education also can be involved in activities and community service (Pozo, 2017).

The study that was conducted by Mardiansyah and Senda (2011) at Stanford University implies that successfulness is mainly determined by behavior (for about 87,5%) and only 12,5% that caused by academic capabilities. Character education implementation should be conducted step by step and use an appropriate strategy which fits the condition. Character education implementation strategy in education is a part of the integration of a school quality improvement program that is conducted in development, implementation, and curriculum evaluation by education units (Mansur, 2014). Character education implementation in science can be conducted in the syllabus and lesson implementation plan: several activities that have been conducted in learning are sharing, discussion, brief lecture, question and answer, training, simulation, and assignments (Chusnani, 2013).

Al Qahtani and Higgins (2013) have investigated the different effects of e-learning compared with face-to-face learning (conventional method) on the student's final results in higher education institutions. Similar research conducted by Bryner, Saddawi-Konefka, and Gest (2008), McFarlin (2008), O'Leary (2008), Alshwiah (2009), and Gurpinar, Zayim, Ozenci, and Alimoglu (2009) compares blended learning (which combines the e-learning elements and face-to-face instruction) with face-to-face. This research intends to discuss the difference between e-learning usage and traditional learning with integrating character education inside the learning process.

Character education cannot stand alone, and its value becomes a unity with other subjects. Furthermore, character education must be implemented and integrated into campus life, both in class and outside the classroom. This study integrates *ANEKA*-based character education in physics courses through Schoology-based e-learning media to internalize its values and know the effectiveness. The main contribution of this paper is that through e-learning, character education can be done by integrating desired character values, such as *ANEKA*, into student learning. Character values that will be integrated with learning activities are explicitly chosen so that students are willingly and voluntarily willing to be regulated by an e-learning system that is created in such a way as to grow characters that are by *ANEKA* so that it becomes a positive habit for students.

LITERATURE REVIEW

SCHOOLOGY-BASED E-LEARNING

Online education is a growing trend, and many institutions can eventually offer more online courses to a growing number of students (Sun & Chen, 2016). When new digital technology emerges, it is important to demonstrate its effectiveness in supporting distance learning. E-learning can be conceptualized as all forms of learning and teaching which are supported electronically or mediated. E-learning has different definitions ranging from e-learning, online learning, Technology Enhanced Learning (TEL) and distance learning (Moore, Dickson-Deane & Galyen, 2011). E-Learning is an online space where students can interact with learning material and with each other, even without the

physical presence of the instructor, and they are not required to be online at the same time (Al-Qahtani & Higgins, 2013).

Schoology-based e-learning is exciting so that students with high enthusiasm can follow various activities and tasks given by teachers and have a positive impact on improving their learning outcomes (Noor, Hardyanto, & Wibawanto, 2017). Students' responses about mixed learning models with the Learning Management System (LMS), in Yapici and Akbayin's (2012) research, state that students find it is faster to learn and easier to understand the material. Biswas (2013) also states that the application of Schoology-based e-learning makes learning active, and the teacher can motivate students to share their ideas in solving various problems. Schoology (www.schoology.com) is one of several types of Social Learning Networks (SLN) that combines several features of the Learning Management System (LMS) and several social networking features (Social Network), becoming an attractive and easy-to-use learning media, which became known as Social Learning Networks.

Schoology-based e-learning on physics subjects has been conducted by Lestari Widodo (2018) to carry out the assessment process, with a complete assessment feature in making questions about physics materials such as multiple-choice questions (MCQs), matching, and essay. Because facilities in Schoology are very supportive of the writing of text, formulas, and images, it can facilitate the assessment process on physics subjects, and students lose their anxiety in learning physics. This online test can improve student literacy and provide an impact on the treatment that has been given through Schoology.

Teachers are also given absolute authority in processing and managing the course of classroom activities in Schoology. Students cannot arbitrarily carry out activities outside of learning activities because the teacher can take students out of class or deactivate them temporarily. With a proper classroom setting and the provision of weighted and interesting learning material, students will be enthusiastic and responsible for every lesson in Schoology. So e-learning through Schoology media can be useful learning for students (Putri et al., 2014).

CHARACTER EDUCATION

With character education, students will achieve more. Raka et al. (2011) suggest that character education if done correctly will improve student academic achievement. Benninga, Berkowitz, Kuehn, and Smith (2003) describe their research on the relationship between the application of character education and academic achievement in elementary schools in California, United States. The results show that primary schools that carry out intense and well-designed character education tend to have high academic performance. Moreover, research conducted by Vibriyanthy and Fauziyah (2014) states that applying character education improves academic progress, which includes increasing educational value and behavior changes in students.

Karwono (2016) states that character education in schools is related to school management, which includes planning, implementing, and controlling character education in educational activities adequately. Achieving education character is not only determined by the learning material but requires the selection of a precise strategy and the right learning method. Thus, it is not only limited to cognitive abilities but also uses psychomotor or behaviors abilities that provide opportunities for students to explore themselves. The function of education, according to the Law of the Republic of Indonesia Number 20 year 2003 concerning the National Education system, chapter 3, is to develop the capacity and development of the character and civilization of the nation's dignity in the context of the nation's intellectual life, aimed at developing the potential of students to be faithful and fearful to the God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and a democratic and responsible citizen. So efforts are needed to improve human resources through good character education in internalizing character education values. Learning can be done by integrating character values into all subjects and can carry out character education as the subject itself, or through a combined approach.

Joshua, Swastika, and Estiyanti (2016) in their research aimed to see the extent of the effectiveness of the implementation of e-learning on student motivation and learning achievement. The results show that learning opportunities have the most significant role in learning motivation, followed by collaborative learning. High learning motivation using the Social Learning Network, Schoology is a variable that is very influential in learning achievement.

ACADEMIC ACHIEVEMENT

Several studies have found an association between academic achievement and a combination of measures of behavioral and emotional involvement (Wang & Holcombe, 2010), several empirical studies are relative to emotional involvement and achievement. Students who use metacognitive strategies, such as managing their attention and abilities, linking new information with existing knowledge, monitoring and evaluating their progress have better performance on academic outcomes (Boekarts, Pintrich, & Zeidner, 2000). Research by Caprara et al. (2008) also analyzes the development of courses in which students feel successful for independent learning and their contribution to academic achievement in school.

Reyes et al. (2012) in their research show that academic success, to some extent, depends on the emotional component of learning and motivation. These findings have implications for teacher training and development and can serve to illustrate the relationship between teacher support, student involvement, and academic performance. Folashade and Akinbobola (2009) stated that the level of achievement ability had been identified as a significant factor influencing student performance in physics. For more than a decade now, different teaching strategies used in teaching physics have not increased student achievement in subjects at a decent level. It is important to the development of science and technology as a basis for national development and progress to find approaches in learning physics to improve maximum achievement results.

Academic achievement (both in traditional and online learning settings) can be generally defined as achieving particular results in online assignments, examinations, subjects, or degrees, and is usually expressed regarding numerical values or average scores (GPA). Exploration of predictions of online learning success is becoming increasingly important because more students utilize flexible online courses, which are easily accessible (Broadbent & Poon, 2015).

THE PRESENT STUDY

The primary purpose of this research is to give broader insight into the Schoology-based e-learning integrated with character education and academic achievement. According to the theoretical study and relevant research, the purposes of this research are to explain the hypothesis as follows:

(1) There will be a difference of character between students that are taught using Schoology-based e-learning and students taught with the conventional study;

(2) There will be a difference in academic achievement between students that are taught Schoology-based e-learning and students taught with the conventional study;

(3) There will be an improvement of student character because of the implementation of Schoology-based e-learning;

(4) There will be an improvement of academic student achievement because of Schoology-based e-learning implementation.

METHOD

PARTICIPANTS

The research sample consists of 55 students of the 2017 class of the Faculty of Electrical Engineering, Universitas Muria Kudus. Participants were divided into two classes (control and experimental). The experimental class consists of all students who were participants in Schoology-based e-learning. The control class was a conventional class, in which the learning process did not use e-learning. Students were divided into the experimental and control classes based on the results of a randomly taken small piece of paper on which was written the class name. The two classes must come from a homogenous population; this is indicated by doing a pretest at the initial meeting before learning, which is then analyzed by the homogeneity test. A test of homogeneity tests the null hypothesis that different populations have the same proportions of some characteristics (Tanbakuchi, 2009).

DATA COLLECTION PROCEDURE

This research is categorized as quantitative research with a quasi-experiment approach, quasi-experimental designs identify a comparison group that is as similar as possible to the treatment group regarding baseline (pre-intervention) characteristics. The comparison group captures what would have been the outcomes if the programme/policy had not been implemented. Hence, the programme or policy can be said to have caused any difference in outcomes between the treatment and comparison groups (White & Sabarwal, 2014). Each subject of both groups must come from a homogeneous population. The homogeneous population model assumes the expected values and variances are the same for the variable interest for all population units. The design that is most appropriate for this type of population is usually simple random sampling without replacement (Chambers & Clark, 2012). Homogeneity test was carried out after obtaining the pretest results tested at the initial meeting before the learning process was carried out both in the control class and the experimental class.

The study was conducted at Universitas Muria Kudus, and the population observed was students of Electrical Engineering study programs who took physics courses. This study involved two variables, namely the experimental variable and the dependent variable. The experimental variable was the treatment variable for the experimental class, namely the learning of physics through Schoology-based e-learning media, and the treatment variable for the control class that is used as a comparison, namely conventional learning, while the dependent variable is *ANEKA*-based character education.

Data collection techniques in this study are questionnaires and written tests given to students before and after treatment in both classes. To validate the instrument used in this study, competent experts reviewed the instruments and were asked for their opinions on the validity of the instruments. After the instrument has been reviewed and has fulfilled the requirements, the next step is to conduct a trial in the field to obtain the construct validity. After the data is obtained and tabulated, the construct validity testing is done by factor analysis. Data analysis techniques are carried out by steps:

(1) testing the requirements of analysis by testing the normality using the Kolmogorov-Smirnov method for homogeneity tests carried out by Levene's test, and

(2) testing the hypothesis in this study for hypotheses "There will be a difference of character and academic achievement between students that are taught using Schoology-based e-learning and students taught with the conventional study" using the F-ANOVA test. Moreover, for hypotheses "there will be an improvement of student character and academic student achievement because of the implementation of Schoology-based e-learning" using paired samples t-test.

RESULTS

Research of character education integration *ANEKA*-based on physics through Schoology-based e-learning was conducted. The preliminary study was conducted through literature studies and field survey. Schoology-based e-learning media was created based on physics lessons, integrating *ANEKA*-based character education value. A written test in the form of essay test and questionnaire sheet was conducted at the initial meeting before the learning process began and at the final meeting after all the learning processes were completed. The essay test was used to measure student results, and the questionnaire was used to measure student initial and final character value.

Research was conducted in several phases. The research instruments were made in the form of a learning process plan, Schoology-based e-learning module, essay test, *ANEKA* questionnaire sheet, and other material in the physics courses, integrating *ANEKA*-based character. The first phase was conducting validation of the research instruments. In studying using Schoology-based e-learning, students are expected to increase *ANEKA*-based education character that integrates into the learning process. Learning process activities in physics were conducted on the control class and experimental class, where the control class used the conventional method and the experimental class used Schoology-based e-learning. The subjects of this research were 55 students of electrical engineering, with 28 students in the control class and 27 students in the experimental class. The main material that was given was about the electricity. In the experimental class before the course began, training with the Schoology-based e-learning module was conducted to enable the students to use smartphones or laptops in the learning process.

The results of validation on the learning process plan, essay test, and questionnaire sheet of student character show high validity in its category. On the expanded learning process plan, it shows study achievement and *ANEKA*-based character as its final goal, so all the learning progress that has been created must be adjusted with its goal.

To improve student learning outcomes and *ANEKA*-based character, Schoology-based e-learning is done by integrating *ANEKA*-based character in physics courses, with the ANEKA character indicators developed in this study, namely: (1) **Accountability (*Akuntabilitas*)**; Responsibility, honest, consistent, participatory, (2) **Nationalism (*Nasionalisme*)**; Religious, non-discriminatory, love the nation, respect opinions, (3) **Public Ethics (*Etika Publik*)**; polite, respectful, obedient, high integrity, (4) **Quality Commitment (*Komitmen Mutu*)**; effectiveness, efficiency, innovation, quality-oriented, (5) **Anti-corruption (*Anti Korupsi*)**; independent, hard work, brave, caring. The improvement of *ANEKA*-based characters became a focus in the learning process, both through Schoology-based e-learning and conventional learning. In conducting trials of Schoology-based e-learning, students play an active role in participating in training using modules that are equipped with steps in using Schoology with smartphones through the applications or the web.

At the initial meeting a pretest using essay questions that have been made to find out the students' initial learning outcomes was given. A normality test was then carried out from the data obtained. A normality test is useful for determining data that has been collected is normally distributed or taken from a normal population. The results of the normality test using the Kolmogorov-Smirnov test can be seen in Table 1.

The results of the normality test with SPSS based on the Kolmogorov-Smirnov test show learning outcomes with a significance value of 0.104 in the control class, and 0.061 in the experimental class, based on the criteria for normality testing by determining the real level (significance) $\alpha = 0.05$. Because the significance value of the learning outcomes of the control class and the experimental class shows the value of Sig> α, it can be concluded that the data variable of the learning outcome is normally distributed.

Table 1. The normality test of learning outcomes with the Kolmogorov-Smirnov test

Tests of Normality

	Class	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
Learning Outcomes	Control Class	.151	28	.104
	Experimental Class	.164	27	.061
a. Lilliefors Significance Correction				

To find out whether the data variables are homogeneous or not, a homogeneity test is done using Levene's test. The results of the homogeneity test can be seen in Table 2. The results of the homogeneity test with SPSS based on Levene's test show the learning data with a significance value of 0.134, based on the homogeneity test criteria by determining the real level (significance) of $\alpha = 0.05$. Because the significance value shows the value of Sig> α, it can be concluded that the learning outcome variable data is homogenous.

Table 2. Homogeneity test results using the Levene's test.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Learning Outcomes	Based on Mean	2.404	1	53	.127
	Based on Median	2.328	1	53	.133
	Based on Median and with adjusted df	2.328	1	37.560	.135
	Based on trimmed mean	2.311	1	53	.134

The F-ANOVA test was used to determine the differences in student character values in the control class and experimental class as can be seen in Table 3. Using a significance level (α) of 0.05 obtained a significant value of 0.00 (<0.05), meaning that the first hypothesis about the difference of characters between two class is correct. There are significant differences between the two samples, where there are differences in character values between students taught using Schoology-based e-learning with students taught using conventional learning.

Table 3. F-ANOVA test to determine differences in student *ANEKA*-based character in the control class and experimental class

ANOVA

Final Value-**_ANEKA_** Character

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		5.587	1	5.587	36.462	.000
	Linear Term	Unweighted	5.587	1	5.587	36.462	.000
		Weighted	5.587	1	5.587	36.462	.000
Within Groups			8.122	53	.153		
Total			13.709	54			

While the results of the F-ANOVA test to determine the differences in student learning outcomes in the control class and experimental class can be seen in Table 4, using a significance level of 0.05 obtained a significance level (α) of 0,000 <(α) 0.05, meaning that there are differences in learning outcomes between students taught using Schoology-based e-learning compared to others taught using conventional learning.

Table 4. F-ANOVA test to determine differences in student learning outcomes in the control class and experimental class

ANOVA

Learning Outcomes

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		2969.079	1	2969.079	49.347	.000
	Linear Term	Unweighted	2969.079	1	2969.079	49.347	.000
		Weighted	2969.079	1	2969.079	49.347	.000
Within Groups			3188.848	53	60.167		
Total			6157.927	54			

Paired samples test results to determine the increase in *ANEKA*-based character values and learning outcomes in students in the experimental class can be seen in Table 5. Using paired samples test at the 0.05 significance level, the results showed that there was an increase in student character values due to the implementation of Schoology-based e-learning, with a significance level of $0,000 < (\alpha)$ 0.05.

Table 5. Paired samples test to determine the increase of *ANEKA*-based character and the learning outcomes for students in the experimental class

Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Final ANEKA - Initial ANEKA character	1.296	.465	.090	1.112	1.480	14.475	26	.000
Pair 2	Final learning outcomes – Initial Learning outcomes	36.370	19.145	3.685	28.797	43.944	9.871	26	.000

DISCUSSION

Schoology is a website that combines e-learning and social network. Its features consist of Courses, Group Discussion, Resources, Quiz, Attendance, and Analytics. The display and features on Schoology are almost the same as on Facebook. Using Schoology enables the teachers to continue their student lessons outside the classroom to the digital world. Schoology transforms learning styles; learning that was initially only in the classroom and limited by time becomes available wherever and whenever. A student can study at any time and feel comfortable. Various facilities owned by the student can also be used to make or provide subject matter, quizzes, assignments, and direct assessment by the teacher to students with Schoology.

ANEKA character values given to students are integrated into the learning process, which is written in the lesson plan. Indicators of *ANEKA* value can be seen in Table 6 (Hilyana, 2018).

Table 6. Integration of the *ANEKA*-based character in Schoology-based e-learning

Characters	Indicators
Accountability	Can complete tasks as per responsibility
	No plagiarism in completing the task
	Can defend opinions as truth
	Can be active in discussion activities
Nationalism	Can practice religious values - answer greetings and pray
	No discrimination in interaction with others
	Can grow the love or pride of the state of Indonesia
	Can appreciate the opinions of other friends in discussion activities
Ethics Public	Be helpful and polite to the lecturers and other students
	Can keep the honor of self and others with mutual respect
	Can obey the rules of every lecture and assignment duties
	Speaks right words by the actions done and not sharing the tasks that are individual
Quality commitment	Can provide opinions according to the purpose of the discussion
	Can use a given time well
	Can provide innovative ideas to solve future challenges
	Always update in completing tasks and carrying out lecture/discussion activities
Anti-Corruptions	Can solve its tasks well without involving other friends
	Can earnest effort in completing tasks and conducting lectures
	Courageous in expressing opinions and performance
	Caring for Lecturers and Assisting friends in need

All indicators of the *ANEKA*-based characters were observed in the control class with conventional learning and in the experimental class using Schoology-based e-learning. The values of these indicators are obtained from questionnaires answered by students given at the initial meeting before the learning process begins and at the final meeting, after all, learning activities are completed, the *ANEKA*-based character value questionnaire is shown in the Appendix.

Based on the first hypothesis test: There will be a difference of character between students that are taught using Schoology-based e-learning and students taught with the conventional study; using F-ANOVA test at significance level (α) of 0.05 obtained the significance value of 0.000 (< 0.05), as shown in Table 3. It means that the significant difference between the two samples exists, which is there is the existence of character value between students that are taught using Schoology-based e-learning and students that are taught using conventional learning.

The average value of *ANEKA*-based character is obtained from the results of the Likert-based questionnaire that was answered by the students. The questionnaire filling was held at the initial meeting before the learning process began; the mean value was 3.56 in the experimental class and 3.50 in the control class. Then, after the end of all learning activities, the students fill the same questionnaire, and the result was a higher value than before, which was 4.85 in the experimental class and 4.16 in

the control class. The comparison result can be seen in Figure 2. The differences in the value of *ANEKA*-based characters from experimental and control classes was 0.73 (20%).
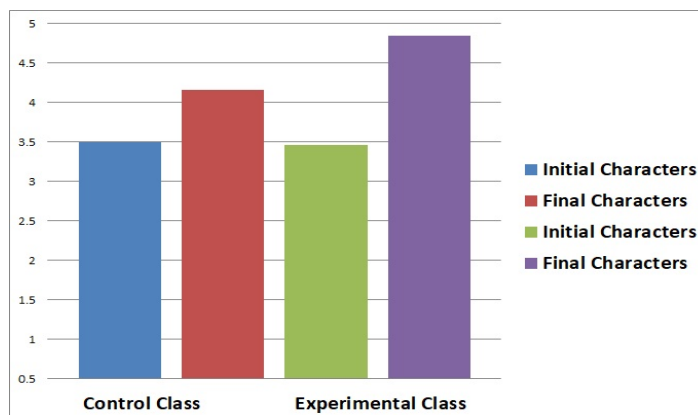

Figure 2. The difference of Mean Character Value Initial and Final on Two Classes

Based on the second hypothesis, there will be a difference in academic achievement between students that are taught using Schoology-based e-learning and students taught with the conventional study. By using the F-ANOVA test with a significance level of 0.05, it was found that there were differences in learning outcomes between students taught using Schoology-based e-learning compared to students taught using conventional learning, getting a significance level (α) of $0,000 < (\alpha)\ 0.05$, as shown in Table 4. It can be stated that there is a significant difference between the study results of students taught using Schoology-based e-learning and students taught using conventional learning.

The average score of the experimental class learning outcomes after learning is higher than before learning. The difference in the average score of the experimental class learning outcomes is 36.37 (68%), while the control class is 25.54 (52%). The difference in the average increase in learning outcome scores between the experimental class and the control class is 14.70 (16%). The picture of the difference in the average increase in academic achievement scores between the experimental class and the control class is shown in Figure 3.
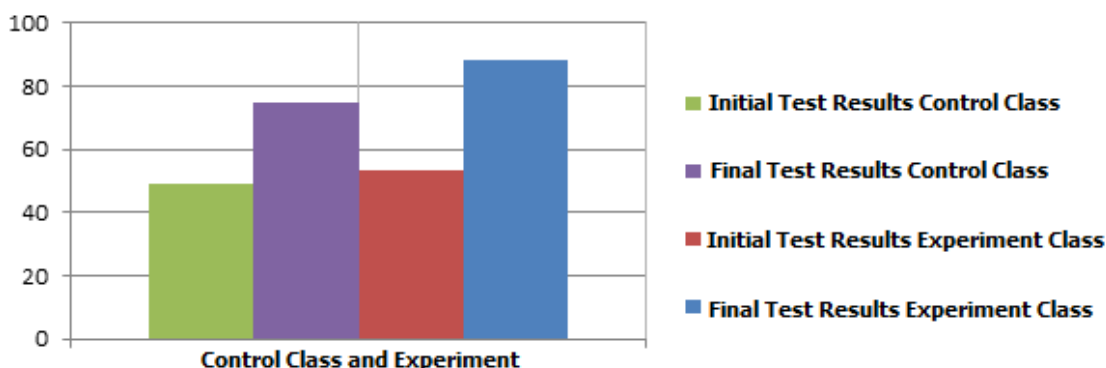

Figure 3. The difference of Student Results Mean Before and After Study on Control Class and Experimental Class

Regarding the third hypothesis, test results with using paired samples test on significance level 0.05 show that there is an increase in student character value caused by Schoology-based e-learning, with significance level $0,000 < (\alpha)0.05$ (Table 5).

The average value of student character in the experimental class measured before learning using Schoology-based e-learning is 3.56. Then after using Schoology-based e-learning, character values are

obtained with an average character value of 4.85, meaning an average increase of 1.29 (36%). An overview of the average increase in character values is presented in Figure 4.
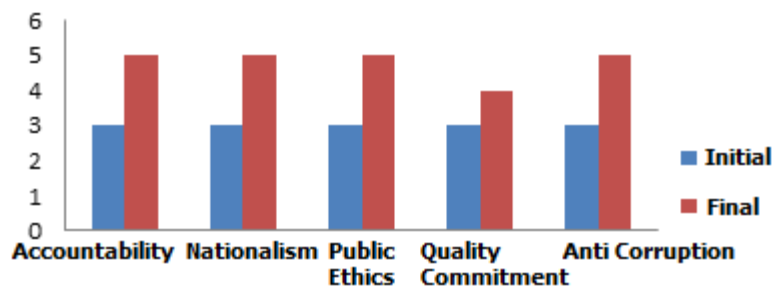

Figure 4. Average value of characters before and after using e-learning Schoology

Regarding the last hypothesis, using a significance level of 0.05, the results also show that there is an increase in learning outcomes with the application of Schoology-based e-learning, where the level of significance is $0,000 <(\alpha)\ 0.05$, with the average results measured before and after are 53.15 and 89.52. This means there is an increase in student learning outcomes in the experimental class of 36.37 (68%) which is higher than the control class which only had an increase of 25.54 (52%). These learning outcomes are obtained from essay tests given at the initial meeting before the learning process begins (pre-test) and at the final meeting after all learning activities are completed (post-test). The increase in the average learning outcomes in the experimental class is shown in Figure 5.
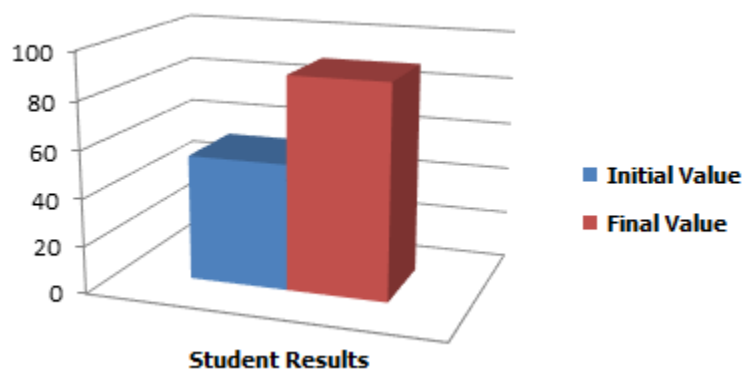

Figure 5. Average Learning Outcomes Before and After Using Schoology-Based E-Learning

In the experimental class with implementation of Schoology-based e-learning *ANEKA* character value increased 36% and student results increased 68%. This statement is in accordance with the statement of Vibriyanthy et al. (2014) which said that the results from the implementation of character education could not be seen instantly because character education is a long process that will change the behavior in daily life.

Physics courses results with integrating *ANEKA*-based character can give an improvement change in student behaviors in their daily life, and their behaviors can be easier to control. Character education also creates a higher education culture and values that underlie the behavior and tradition. Our society needs excellent values to survive and develop so that the internalization of fundamental values in character education needs to be adopted through the education system as a whole. It is because the success of character education is not only seen through student assessment but through various psychosocial problems that affect student attitudes as well.

CONCLUSION

Based on the results of the study it can be concluded that there are differences in **ANEKA**-based characters between students with Schoology-based e-learning compared to others with conventional learning of 0.73 (20%), and the differences in learning outcomes are about 14,70 (16%). **ANEKA** character values of students from the usage of Schoology experienced an increase of 1.29 (36%), and student learning outcomes increased by 36.37 (68%) as well. It can be said that by using Schoology-based e-learning, the integration of **ANEKA**-based character and learning outcomes is higher compared to the conventional method. The results of this study indicate an increase in the value of learning outcomes and **ANEKA**-based character in students, although it has not been seen as significant. For this reason, further research is needed to internalize the value of **ANEKA**-based character by using other methods with other subjects.

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REFERENCES

Al-Qahtani, A. Y., & Higgins, S. E. (2013). Effects of traditional, blended and e-learning on students' achievement in higher education. *Journal of Computer Assisted Learning, 29(3)*, 220-234. https://doi.org/10.1111/j.1365-2729.2012.00490.x

Alshwiah, A. A. S. (2009). *The effects of a blended learning strategy in teaching vocabulary on premedical students' achievement, satisfaction and attitude toward the English language.* (MA Thesis. Arabian Gulf University, Saudi Arabia).

Aminoto, T., & Pathoni, H., (2014). Penerapan Media E-Learning Berbasis Schoology Untuk Meningkatkan Aktivitas dan Hasil Belajar Materi Usaha dan Energi Di Kelas XI SMA N 10 Kota Jambi [Implementation of e-learning media schoology-based to increase activity and study result of matter "work and energy" at class XI SMA N 10 Jambi City]. *Jurnal Sainmatika, 8*(1).

Basori, B. (2013). Pemanfaatan Social Learning Network Schoology dalam membantu perkuliahan teori bodi otomotif di prodi ptm jptk fkip uns [utilization of schoology's social learning network in helping lectures on automotive body theory in PTM JPTK Study Program FKIP UNS]. *JIPTEK: Jurnal Ilmiah Pendidikan Teknik dan Kejuruan, 6*(21), 99-105.

Benninga, J.S., Berkowitz, M.W., Kuehn, P., & Smith, K. (2003). The relationship between character education implementation and academic achievement in elementary schools. *Journal of Research in Character Education, 1*, 19-32.

Biswas, S. (2013). Schoology-supported classroom management: A curriculum review. *Northwest Journal of Teacher Education, 11*(2), 187-188. https://doi.org/10.15760/nwjte.2013.11.2.12

Boekarts, M., Pintrich, P. R., & Zeidner, M. (Eds.). (2000). *Handbook of self-regulation: Theory, research, and applications.* San Diego, CA: Academic Press.

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *Internet and Higher Education, 27*, 1–13. https://doi.org/10.1016/j.iheduc.2015.04.007

Bryner, B. S., Saddawi-Konefka, D., & Gest, T. R. (2008). The impact of interactive, computerized educational modules on preclinical medical education. *Anatomical Sciences Education, 1*(6), 247-251. https://doi.org/10.1002/ase.55

Caprara, G. V., Fida, R., Vecchione, M., Bove, G. D., Vecchio, G. M., Barbaranelli, C., & Bandura, A. (2008). Longitudinal analysis of the role of perceived self-efficacy for self-regulated learning in academic continuance and achievement. *Journal of Educational Psychology, 100*(3), 525–534. https://doi.org/10.1037/0022-0663.100.3.525

Chambers, R., & Clark, R. (2012). *An introduction to model-based survey sampling with applications*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198566625.001.0001

Chusnani, D. (2013). Pendidikan Karakter Melalui Sains [Character education through science]. *Jurnal Kebijakan dan Pengembangan Pendidikan*, *1*(1), 9-13.

Divayana, D. G. H., Ariawan, I. P. W., Adiarta, A., Parmiti, D. P., Mahendra, I. W. E., & Parmithi, N. N. (2018). Development of ANEKA-based countenance model integrated with Tri Hita Karana-SAW in evaluating student's character and quality of computer learning in Bali. *Journal of Engineering and Applied Sciences*, *13*(15), 6303-6315.

Evale, D. S. (2017). Learning management system with a prediction model and course-content recommendation module. *Journal of Information Technology Education: Research, 16,* 437-457. https://doi.org/10.28945/3883

Folashade, A. & Akinbobola, A. O. (2009). Constructivist problem-based learning technique and the academic achievement of physics students with low ability level in Nigerian secondary schools. *Eurasian Journal of Physics and Chemistry Education, 1*(1), 45-51.

Gurpinar, E., Zayim, N., Ozenci, C. C., & Alimoglu, M. K. (2009). First report about on e-learning application supporting PBL: Students' usages, satisfaction, and achievement. *The Turkish Online Journal of Educational Technology, 8*(2).

Hilyana, F. S. (2018). Implementation of schoology-based e-learning to improve the ANEKA-based character. *The 1st International Conference on Computer Science and Engineering Technology* (p.8-15). Universitas Muria Kudus. https://doi.org/10.4108/eai.24-10-2018.2280558

Joshua, J. W. N., Swastika, I. P. A., & Estiyanti, N. M. (2016). The effectiveness of e-learning implementation using social learning network schoology on motivation & learning achievement. *Journal Nasional Pendidikan Teknik Informatika (JANAPATI), 5*(1), 28-33.

Karwono. (2016). Character education as an effort to increase the benefits of human resources. *Scientific Journal of PPI-UKM, 3*(3), 119-122.

Kemendiknas. (2010). *Bahan Pelatihan Penguatan Metodologi Pembelajaran Berdasarkan Nilai-nilai Budaya Untuk Membentuk Daya Saing dan Karakter Bangsa* [Training materials of strengthening learning methodologies based on cultural values to form national competitiveness and characters]. Jakarta: Kemendiknas.

Mansur, H. R. (2014). Implementasi Pendidikan Karakter di Satuan Pendidikan [Implementation of character education in the education unit]. *Artikel LPMP SulSel*, 1-13.

Mardiansyah, D., & Senda, I. (2011). *Keajaiban Berperilaku Positif* [The miracle of positive behavior]. Jakarta: Tangga Pustaka.

McFarlin, B. K. (2008). Hybrid lecture online format increases student grads in an undergraduate exercise physiology course at a large urban university. *Advances in Physiology Education, 32*, 86 -91. https://doi.org/10.1152/advan.00066.2007

Moore, J. L., Dickson-Deane, C., & Galyen. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education, 14*(2), 129-135.

Noor, M.E., Hardyanto, W., & Wibawanto, H. (2017). Penggunaan E-Learning dalam Pembelajaran Berbasis Proyek di SMA Negeri 1 Jepara [Application E-learning in Learning Project-Based at SMA Negeri 1 Jepara]. *Innovative Journal of Curriculum and Educational Technology, 6(1).*

O'Leary, M. B. (2008). *A case study of student learning outcomes based on the implementation of a blended course format in introductory Spanish*. (Ph.D. Thesis, University of Alabama, Tuscaloosa, USA.)

Oladejo, M. A., Olosunde, G. R., Ojebisi, A. O., & Isola, O. M. (2011). Instructional materials and students' academic achievement in physics: Some policy implications. *European Journal of Humanities and Social Sciences, 2*(1), 113-126.

Parsad, B., Lewis, L., & Tice, P. (2008). *Distance education at degree-granting postsecondary institutions: 2006-07*. Washington D.C.: National Center for Education Statistics Institute of Education Sciences.

Pozo, C. L. P. (2017). Smart education and Smart e-learning. In *The International Scientific Conference eLearning and Software for Education* (Vol. 3, p. 89). " Carol I" National Defence University. https://doi.org/10.12753/2066-026x-17-186

Putri, N. W. M. A., Jampel, N., & Suartama, I. K. (2014). Pengembangan E-Learning Berbasis Schoology Pada Mata Pelajaran IPA Kelas VIII di SMP Negeri 1 Seririt [Development e-learning scoology-based of science courses at class VIII SMP Negeri 1 Seririt]. *Journal Edutech Universitas Pendidikan Ganesha Jurusan Teknologi Pendidikan*, *2(1)*.

Raka, G., Mulyana, Y., Markam, S. S., Semiawan, C. R., Hasan, S. H., Bastaman, H. D., & Nurachman, N. (2011). *Pendidikan Karakter di Sekolah; dari Gagasan ke Tindakan.* [Character education in schools; From ideas to action]. Jakarta: Elek Media Komputindo.

Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of Educational Psychology, 104*(3), 700-712. https://doi.org/10.1037/a0027268

Sun, A., & Chen, X. (2016). Online education and its effective practice: A research review. *Journal of Information Technology Education: Research, 15,* 157-190. https://doi.org/10.28945/3502

Tanbakuchi, A. (2009). *Introductory statistics lectures tests of independence and homogeneity contingency tables.* Department of Mathematics: Pima Community College.

Vibriyanthy, R., & Fauziah, P. Y. (2014). The implementation of character education in homeschooling Kak Seto Yogyakarta. *Jurnal Pendidikan dan Pemberdayaan Masyarakat, 1*(1), 75-85. https://doi.org/10.21831/jppm.v1i1.2358

Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *American Educational Research Journal*, *47*(3), 1–30. https://doi.org/10.3102/0002831209361209

White, H., & Sabarwal, S. (2014). *Quasi-experimental design and methods, methodological briefs: Impact evaluation 8*. Florence: UNICEF Office of Research.

Widodo, L. (2018). Schoology on physics for reducing learners' anxiety in online testing. *International Journal of Multidisciplinary Research and Development*, *5*(5), 35-39.

Yapici, I. U., & Akbayin, H. (2012). High school students' views on blended learning. *Turkish Online Journal of Distance Education-TOJDE, 13(4)*, 125-139.

APPENDIX

The ANEKA-based Character Questionnaire

STUDENT QUESTIONNAIRE
—ANEKA—

Choose one of the most appropriate answers by checking (√) on each question (sentence description) below.
5 = Strongly Agree, 4 = Agree, 3 = Enough Agree, 2 = Slightly Agree, 1 = Disagree.

No	Statements	Answer				
		5	4	3	2	1
1.	I can carry out the obligation to study according to the target					
2.	I accept the risk if there is an error in learning					
3.	I did not commit plagiarism / cheating in completing study assignments					
4.	I carry out my assignments sincerely					
5.	I say according to what happened / did not lie during the learning process					
6.	I always maintain opinions according to the truth					
7.	I adjust the speech and behavior that I do					
8.	I can play an active role in learning activities					
9.	I am always responsive and immediately provide solutions in learning					
10.	I can practice religious values (answering greetings and prayers) in learning					
11.	I say good and behave well in learning					
12.	I do not distinguish one friend from another friend in any case					
13.	I use Indonesian well in learning					
14.	I recognize equality of rights & obligations (not discriminating against origin) in learning					
15.	I heed the opinions of other friends in learning					
16.	I see the importance / useful opinions of others					
17.	I speak / greet others well					
18.	I am nice and don't act with other people					
19.	I acknowledge and obey the rules of learning					
20.	I am looking after both myself and others					
21.	I obey commands that guide goodness in learning					
22.	I am loyal to the college rules on campus					
23.	I speak words that are good according to the actions taken					
24.	I am not sharing assignments that are individual in nature / I have high honesty in lectures					
25.	I can give opinions in accordance with the goals / right target in learning					
26.	I can bring results that are useful in carrying out learning activities					
27.	I do not waste time & energy in learning activities					
28.	I carry out the task correctly and carefully in learning					
29.	I provide an introduction to new things in learning					
30.	I Determine the quality correctly and correctly in learning					
31.	I emphasize everything on the quality of college learning					
32.	I can complete my own tasks well without depending on others					
33.	I do not cheat on the duties of others					
34.	I can try earnestly in completing college assignments					
35.	I completed the assignment on time					
36.	I am looking for outside sources of information in completing college assignments					
37.	I am brave in conveying opinions and performance in learning					
38.	I am confident in facing the difficulties of college learning					
39.	I pay attention to the lecturer and provide assistance to friends who need learning					
40.	I say thank you to others					

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