

Application of Adaptive Media and Engaging E-learning for Students in E-learning Courses

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Abstract

This study aims to apply adaptive and engaging e-learning media for students who take e-learning courses, and see how the results of learning styles and learning activities while using these media in the learning process. The research method used was an experiment. The instrument uses a learning style questionnaire and an observation sheet of e-learning activities. The findings in the experimental class students have varied learning styles such as visual, auditory and kinesthetic learning styles, from these results the kinesthetic learning styles are classified as higher, and the results of learning activities with a percentage of 73.75% are good categories. The results of the learning activities of the control class students with a percentage of 63.28% both categories. In conclusion, students use adaptive media engaging e-learning where the kinesthetic learning style is more domainic, and the results of student learning activities are higher than the results of activities using conventional e-learning media. The renewal of these findings contributes differently to previous online learning, because through adaptive and engaging e-learning media students are able to learn online according to their learning styles such as visual, kinesthetic and auditory learning styles on the website and accompanied by online learning activities.

Keywords: Adaptive E-Learning, Activities, Learning Styles

1. Introduction

The development of technology in the era of the industrial revolution 4.0 is a potential driving force for progress in the implementation of learning in higher education. The emergence of technological breakthroughs in the field of information and communication technology has also influenced the teaching and learning scenario (Bialik & Fadel, 2015; Feladi et al., 2020). One type of learning related to the era of the industrial revolution 4.0 is through online learning (Hussin, 2018; McGrew et al., 2018). With these technological developments, it allows teachers to transform from traditional teaching to digital through online so as to make the learning environment more flexible. Changes in the current learning paradigm provide opportunities for students to learn independently, centering on students, engaging, interactive, affordable, efficient, effective, easily accessible, flexible, and meaningful in an e-learning or online learning environment (Khan, 2007; Thai et al., 2017). Online learning is able to channel information, provide interaction services anywhere and anytime, learning becomes effective, students can access learning materials at any time and repeatedly.

Online learning is closely related to e-learning. In general, e-learning is often defined as learning using electronics which allows learning to occur anywhere and anytime without being limited by space and time (Khan, 2005). E-learning is an education system that uses electronic applications to support teaching and learning using the internet, computer networks, and standalone computers (Sivalingam et al., 2018). Through e-learning, learning becomes efficient in terms of time, cost, and energy. As well as being flexible in learning that can be done anywhere and anytime without the limitations of space and time (Sivalingam et al., 2018). In general, e-learning is used to learn electronically, and this term

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is known as conventional e-learning (Dharmayanti et al., 2018; Verawardina, 2017). The development of e-learning media began because there was a gap in conventional e-learning which had limitations that were only able to provide material in online form only in the form of presentations with the same form (Elfaki et al., 2019; Guri-Rosenblit, 2018). The gap from this conventional e-learning system is that the appearance of the website does not suit user characteristics, because users are considered to have the same or equal ability to access e-learning, while each student has different learning style characteristics. Based on the findings that the style that occurs in e-learning media still has weaknesses, namely it cannot adjust the learning styles of students, so that the material presented is only in general form. (Dharmayanti et al., 2018; Yarandi et al., 2013).

In the current era of technology, e-learning media are often developed, such as adaptive e-learning, namely electronic learning media that can be accessed wherever and whenever it is displayed according to the characteristics of the diversity of user learning styles (Mestre, 2012). Adaptive learning systems have attracted many researchers in the e-learning field. The adaptive learning concept was originally introduced to modify the gaps in teaching strategies based on student needs (Ali et al., 2019). The problem that occurs in students has a problem, namely different learning styles are not the same (DePorter et al., 2014). Therefore, based on the gap that occurs, an effort is needed to be able to implement e-learning media that suits the needs of student learning styles. In this study, adaptive and engaging e-learning media is applied to e-learning courses, where e-learning courses discuss the content of competencies that must be mastered by students consisting of the basic concepts of e-learning, e-learning characteristics, managing knowledge through e-learning (knowledge management), learning strategies through e-learning developing web-based e-learning accessing e-learning systems and getting to know web-based e-learning installing e-learning systems (LMS Open source), setting and design e-learning adding users to class groups, developing subject matter into the e-learning system, developing learning activities on e-learning. The e-learning course is chosen because it is considered in accordance with the media that will be applied to the e-learning course, so that students not only understand e-learning subject matter but can also be involved and experience learning directly.

The gap that occurs is based on observations and interviews at PTIK IKIP PGRI Pontianak Study Program, in semester IV (six) students who take e-learning courses and lecturers who teach e-learning courses, namely the implementation of learning e-learning courses, using e-learning media have not adjusted student learning styles, while students have different learning styles. In terms of the use of e-learning media it is still not optimal because it is only used in presenting material, in text form, there are no activities used to support student involvement in learning through the e-learning system, for example chat activities, assignments, evaluations, and so on. In this course, students can construct their own knowledge by using student-centered independent learning according to their own learning styles, while supporting the implementation can be done by utilizing technology, one of which is through adaptive and engaging e-learning media. On the other hand, learning to use e-learning cannot be separated from the existence of online learning activities. The availability of online learning activities to make students directly involved in learning and interact with each other through chat, forums, assignments and quizzes (Dermawan & Permana, 2013; Dharmayanti et al., 2018). The supporting theory that underlies e-learning is the theory of engagement. Engagement theory is where students are significantly involved in learning activities through interactions with other students and certain tasks (Prasojo & Riyanto, 2011). One of the adaptive e-learning media and the element of engagement, namely adaptive and engaging e-learning media, which is part of learning electronically via the internet, which can be accessed anywhere and anytime. Adaptive and engaging e-learning media is made based on the characteristics of student learning styles that are visual, auditory and kinesthetic (VAK), and has an element of involvement for students through learning activities such as assignments, chats, forums, and so on (Verawardina, 2017).

Based on the explanation above, it is therefore necessary to be able to implement e-learning media according to the learning style needs of students so that it is easier to

understand the material and be actively involved in learning. So that to overcome these problems, adaptive and engaging e-learning media are implemented that are equipped with activities so that students are not passive in learning and adjust to student learning styles.

This research is considered important because adaptive and engaging e-learning media can improve student skills because students can learn according to their learning style (Verawardina, 2017). Adaptive e-learning media can adjust learning styles so that they fit the needs of students in learning (Dharmayanti et al., 2018). The purpose of an e-learning system is to offer learning materials for specific learners taking into account their learning styles (Sivakami & Poorani, 2015). Adaptive e-learning makes it possible to combine and integrate learning content and services to enhance learner experiences. In addition, adaptive systems provide solutions to problems based on various factors (Gopalakrishnan et al., 2014). The media is packaged according to the learning style so students can choose and feel comfortable to study so that it is easy to understand the material (DePorter et al., 2014). The presence of engaging elements can increase the involvement of students in learning (Conrad & Donaldson, 2011). Therefore, the location of the contribution in this research allows each individual to learn according to their respective learning styles so that it is easier to understand the material and can be actively involved in learning.

The urgency of research with these media can help students understand e-learning course material in a real form so that it can increase effectiveness to achieve learning outcomes, good learning activities in e-learning courses, and students can learn according to their respective learning styles. The purpose and focus of this research is to determine student learning styles after using adaptive and engaging e-learning media, and to see student learning activities after being treated using adaptive and engaging e-learning media and activities with conventional e-learning media.

2. Method

This research uses experimental research, with a quasi experimental design, which can be seen in Table 1.

Table 1. Control group posttest design

Experiment	X_1	T1
Control	X_2	T2

Notes:

T1 and T2 = The final test is through an online activity observation sheet assessment.

X_1 = Treatment by applying learning using adaptive media and engaging e-learning.

X_2 = Treatment using conventional e-learning.

The quasi-experimental design was chosen because of the treatment given to the experimental class and control class. For the experimental class, learning uses adaptive and engaging media, while in the control class learning uses conventional e-learning. In both classes, the assessments were measured in relation to student online activities. In addition, the experimental class also assesses the classification of student learning styles through a learning style questionnaire contained in the adaptive and engaging e-learning media system. The data analysis technique was used descriptively through mean and percentage values. The sample used is semester IV (six) students who take e-learning courses at PTIK IKIP PGRI Pontianak Study Program. In the morning class experiment class C there were 30 students. While the control class C Afternoon amounted to 32 students. The data collection instrument uses a learning style questionnaire found on the website adaptive and engaging e-learning. The questionnaire is used to classify student learning styles whether they have visual, auditory and kinesthetic learning styles. In addition, it is also through observation sheets for e-learning activities such as chat, forums, assignments and quizzes. For data

analysis techniques used through descriptive statistics by describing the results of learning styles and activities through percentages and averages.

3. Result and Discussion

Results

The results of student learning styles on the use of adaptive and engaging e-learning media can be seen in Table 2. Based on Table 2, it can be seen that the results of the classification of the student learning style questionnaire in the PTIK IKIP PGRI Pontianak Study Program in the e-learning course, it is known that there are 10 students with a visual learning style with an average (mean) of 0.3333 standard deviation. equal to 0.47946, and the variance of 0.230. There are 6 students with an auditory learning style with an average (mean) of 0.2000 baku standard deviation of 0.40684 and a variant (variance) of 0.166. Meanwhile, there were 14 students with a kinesthetic learning style with an average (mean) of 0.4667, a standard deviation of 0.50742 and a variance of 0.257. The classification of student learning styles can be seen in Figure 1.

Table 2. The results of the learning style questionnaire classification

Information	N	Sum	Mean	Std Deviation	Variance
Visual	30	10.00	0.3333	0.47946	0.230
Auditory	30	6.00	0.200	0.40684	0.166
Kinesthetic	30	14.00	0.467	0.50742	0.257
Valid N	30				

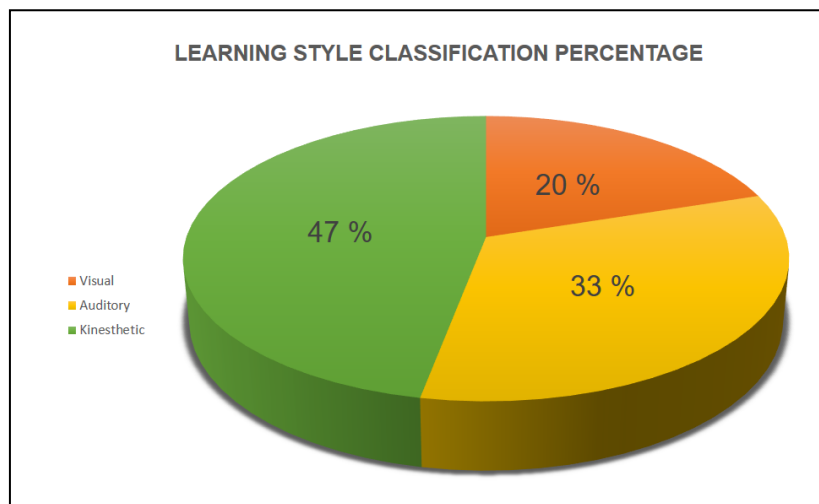


Figure 1. Learning style classification percentage

Based on Figure 1 it is known that of the 30 students of class C in the 6th semester of the PTIK IKIP PGRI Pontianak Study Program in the e-learning subject, have a visual learning style with a percentage of 33%, an auditory learning style with a percentage of 20% and a kinesthetic learning style with a percentage of 47%. It can be concluded that the highest learning styles are in the kinesthetic (47%) and visual (33%) learning styles and the lowest in the auditory learning styles (20%). For the results of the calculation of the results of activities with steps, namely calculating the total score for each category and cumulative, and conducting benchmark reference assessments (PAP) for the final score based on the final score scale (acquisition score: maximum score) x 100. Then the results of observing learning activities using media. The results of learning activities using adaptive and engaging e-learning media are presented in Table 3.

In Table 3, the results of learning activities using adaptive media and engaging e-learning are chat activities with a total of 99 and a percentage of 82,50% , forum activities

with a total of 58 and a percentage of 48,33% , of assignment activities with a total of 97 and a percentage 80,33% and the quiz activity obtained a total of 100 and a percentage of 83,33%. The result is the percentage of total activity 73,75% with good category. The results of activities using conventional e-learning media are presented in Table 4.

Table 3. Results of learning activities using media adaptive and engaging e-learning

Category	Amount	Percentage	Category
Chat	99	82,50%	Very Good
Forum	58	48,33%	Adequate
Assignment	97	80,33%	Good
Quiz	100	83,33%	Very Good
Percentage of Total Activity		73,75%	Good

Table 4. The results of learning activities using conventional e-learning media

Category	Amount	Percentage	Category
Chat	68	53,13%	Adequate
Forum	72	56,25%	Adequate
Assignment	99	77,34%	Good
Quiz	85	66,41%	Good
Percentage of Total Activity		63,28%	Good

In Table 4, the results of learning activities using conventional e-learning are chat activities with a total of 68 and a percentage of 53,11% , forum activities with a total of 72 and a percentage of 56,25% , of assignment activities with a total of 99 and a percentage of 77,34 % and the quiz activity obtained amounted to 85 and a percentage of 66,41%. The result of the percentage of total activity is 63,28% with good category. It was concluded that the results of student activities using adaptive and engaging media were better than students using conventional e-learning media.

Discussion

This study aims to apply adaptive and engaging e-learning media for students taking e-learning courses at the PTIK IKIP PGRI Pontianak Study Program, and see how the learning styles and learning activities result while using these media in the learning process. E-learning is defined as electronic learning, e-learning is very appropriate to be used to change a face-to-face learning culture into electronic, as well as combine both face-to-face and electronically. In its connotation, e-learning can be used effectively, flexibly and efficiently. By using e-learning students can study in many places, be it at school, at home, on trips and so on. E-learning which is known today is still only used for online learning. Through e-learning students can learn flexibly but students are still difficult to learn independently using e-learning, so it is recommended to be able to use several strategies (Guri-Rosenblit, 2018). By learning to use e-learning students can learn online (Ngampornchai & Adams, 2016). E-learning contributes to online instruction and has a positive influence on learning outcomes, but interaction is still lacking (Elfaki et al., 2019). E-learning that is used for online learning is also known as conventional e-learning which has weaknesses that have not adapted to the characteristics of the user's learning style (Dharmayanti et al., 2018). The use of e-learning learning becomes efficient in terms of time , cost, and energy (Sivalingam et al., 2018).

Based on the presentation of the findings of the study regarding e-learning, it still has weaknesses such as being limited to online learning only, lack of interaction that shows online learning activities have not been implemented, besides that it is not yet in accordance with the learning styles of students, so that teachers must be able to implement strategies in learning using e-learning. E-learning can be developed with the concept of adaptive and

engaging e-learning, which is based on visual, auditory and kinesthetic learning style modalities, and is supported by engagement through activities (Yarandi et al., 2013). There is a development of e-learning that can create adaptive content based on individual abilities, learning styles, levels of knowledge and preferences, the learning mode describes student characteristics that are tailored to the content of interest. Each person is different then has different learning modes such as visual style (seeing), auditory (hearing), kinesthetic (moving), and tactile (touching). (Ryan & Cooper, 2013). Learning styles such as visual, auditory and kinesthetic certainly must be considered to be implemented in learning, as well as the learning media used to convey teaching materials in various forms, for example through text, video, audio, direct involvement, and so on. Because thus students can choose and feel comfortable to study so that it is easy to understand the material being studied so that it is expected to have an effect on better learning outcomes. With the weaknesses of e-learning, it can be recommended by implementing adaptive e-learning that can modify teaching materials according to the needs of students (Melicherikova & Busikova, 2012). Meanwhile, one of the successes of the e-learning environment is strongly influenced by factors such as through the identification of individual learning styles of students (Vranic et al., 2007).

This research aims to apply adaptive and engaging e-learning media for students taking e-learning courses at the PTIK IKIP PGRI Pontianak Study Program, and see how the learning styles and learning activities result while using these media in the learning process. In addition, at the research location at IKIP PGRI Pontianak, students during observations and interviews conveyed that they have different learning styles, but the learning that occurs has never studied this, so an e-learning media solution is needed that can match the needs of each learning style college student. This research is applied to adjust student learning styles in learning and to apply online activities to e-learning in e-learning courses. Where the adaptive and engaging e-learning media can adapt students' learning styles to learning and the existence of online learning activities (Verawardina, 2017).

In this study, the use of adaptive and engaging e-learning media in the experimental class is used, where when students access the media electronically, they will be exposed to a learning style questionnaire contained in the e-learning website system, and fill in several questions so that they receive the results of student learning styles, whether students are classified as visual learning styles (seeing), auditory learning styles (hearing), or kinesthetic learning styles (moving), then the system in the media will display student material according to their respective learning styles. Then in the learning, student activities were observed such as the use of forum activities for students and lecturers to discuss and collaborate in learning. The discussion topic relates to the lecture material, namely about accessing e-learning systems and getting to know web-based e-learning and installing e-learning systems (LMS Open source). Through this discussion forum students participate by providing comments on discussion topics, besides that there is also a discussion group consisting of 4-5 people in groups between students, each group creates discussion topics and comments on each other to convey their opinions. The role of lecturers as facilitators and mentors during the online discussion process occurs.

In addition, the use of chat activities to interact between students and lecturers, students can ask each other to share about lectures, delivery of information, subject matter and other things, and the role of the lecturer as a guide and facilitator. There are assignment activities given by lecturers to students, assignments given 2 assignments regarding paper making, where the assignment is given a deadline for submitting assignments and assignments collected online, then the lecturer immediately assesses and students can see the results. Finally, quiz activity is in the form of giving online tests. In processing the quiz, students are given an allocation of time and when it has been completed, the quiz is assessed through the system so that students can find out the learning outcomes obtained. Assessment of student learning activities uses adaptive and engaging e-learning media and conventional e-learning through observation sheets after using the product. The observation sheet used contains several categories of observations on student activity tailored to the use of adaptive and engaging e-learning media. As for the category of observations, student

activities are observed such as using chat for consultation or guidance to lecturers and interactions with other students. Then students use the forum to discuss with lecturers and other students, and students view assignments and submit assignments online, as well as students taking quizzes / tests online.

The results of student learning styles in visual learning styles amounted to 10 people with an average (mean) of 0.3333, for students with auditory learning styles totaling 6 people with an average (mean) of 0.2000, while students with kinesthetic learning styles totaled 14 people with an average (mean) of 0.4667. From these results it can be seen that student learning styles vary, there are visual, auditory and kinesthetic types, for kinesthetic learning styles are higher learning styles. For activity results with a percentage of 73.75%, the category is good. Whereas in the control class students who are taught using conventional e-learning media in presenting the material in the same form, namely through presentation alone do not have a learning style so that it cannot be measured, for the results of their activities with a percentage of 63.28% in good category. It is concluded that students use adaptive media engaging e-learning where the kinesthetic learning style is more domain, and the results of student activity are higher than the results of activities using conventional e-learning media. Based on these results, adaptive media engaging e-learning can adjust student learning styles according to their respective styles and be actively involved in online learning activities.

Based on the findings, adaptive e-learning can make students learn according to their style (Ali et al., 2019). In addition, through e-learning which is packaged with the concept of learning styles can make it easier for students to understand the material through illustrations and depicting concepts (Mestre, 2012). The results of the study revealed that the adaptive e-learning system could effectively support students with personalized learning materials and succeeded in helping students gain knowledge and develop cognitive abilities and place students to learn according to their respective learning styles (Wu et al., 2017). The novelty of these findings makes a different contribution from previous online learning, by using e-learning students can learn flexibly through online instruction only (Elfaki et al., 2019; Ngampornchai & Adams, 2016; Sivalingam et al., 2018). Meanwhile, through adaptive and engaging e-learning media students are able to learn online according to their respective learning styles such as visual, kinesthetic and auditory learning styles and accompanied by online learning activities on the website.

4. Conclusions and Suggestions

The findings show that the adaptive and engaging media in the experimental class have varied learning styles such as visual, auditory and kinesthetic learning styles, from these results the kinesthetic learning styles are classified as higher, and the activity results with a good categories. The results of the control class student activity with a good category. In conclusion, students use adaptive media engaging e-learning where the kinesthetic learning style is more domain, and the results of student learning activities are higher than the results of activities using conventional e-learning media. The implication of these findings can place students learning according to their respective learning styles and foster online learning activities to be more active in e-learning courses. Recommendations from the results of this study can add other classifications of learning styles not limited to visual, auditory and kinesthetic learning styles. Likewise, activities in e-learning can be added to other activities.

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