Application of the E-Learning with Adaptive Theory Information Model in English for Mathematics Lectures

E Z Jamaan*, Arnellis

1Mathematics Department, Faculty of Mathematics Science Universitas Negeri Padang, Indonesia

*corresponding author: elitajamaan_mat@fmipa.unp.ac.id

Abstract. After the emergence of the Covid-19 outbreak, the education system began to look for the latest innovations to form an effective lecture process with a learning model that was suitable for students in distance learning using the E-Learning learning model which was been adaptive additional information was needed. It’s known as the Elita model. The purpose of this research is to produce profile information about Elita's users who are categorized, in student's achievement and student's preferences in English for Mathematics lectures. This type of research is a mixture of qualitative and quantitative. Quantitative data were obtained from tests, and qualitative data were obtained from interviews and observations. The population is students of Mathematics Education, Universitas Negeri Padang. The sample was 43 students from January to June 2020 semesters. The instruments used were interview guides, field notes, and tests. The results obtained were the achievement of student's achievement in understanding the EFM lecture material, an increase in the average score, while the results of student’s preference in the EFM lecture process with the Elita model was moderate.

1. The first section in your paper

The English proficiency is needed in Mathematics courses, this is because many textbooks used in the lecture process use English. Therefore, we need a course that introduces mathematical terms in English. The English for Mathematics course is one of the compulsory courses taken by students of the UNP Mathematics Education Study Program. The mathematics education study program opens English for Mathematics courses, so that students can understand every material in mathematics and can communicate properly and correctly not only using Indonesian but also using English. Fadjar [1] said that "as long as the mathematics learning process is taking place in the classroom, Besides having good mathematical knowledge, the ability to communicate especially in presentations are two aspects that really support the success of the learning process. Suyitno [2] emphasizes that mathematics as a grammar game has rules in the sense of "grammar". Mathematical conception is concerned with the system of something that represents it, which in the end is able to describe. With sufficient English language skills, scientific accessibility is opened. These two sciences, in essence, are increasingly complementary, very influential on scientific development so that if these two sciences are well mastered, they will become a strong basis for the development of other science / science and technology.

The development of information and communication technology in the Industrial 4.0 era has had a major influence on the teaching and learning process. Along with the emergence of the Covid-19
pandemic outbreak, the education system has begun to look for the latest innovations to form an effective lecture process with a learning model that is suitable for students in distance learning using the E-Learning learning model [3]. The e-learning system has been developed by various educational institutions and has become very important in the implementation of distance education. Rosenberg [4] defines e-learning as the use of Internet technology to distribute learning material so that students can access it from anywhere. The current e-learning system generally presents the same presentation of learning material for each user because it assumes that the characteristics of all users are homogeneous, even though in reality each student has different characteristics in learning, including background and the level of knowledge, learning activities, independent learning, learning styles, maturity levels, and learning achievement, and so on [5].

In fact, the lecture system in this course is still limited. Based on the researcher's experience during teaching this course, the lecture system used in this course causes students to tend to be silent and inactive. From the interviews conducted by the lecturer, the results were concerning. Many students did not know mathematical terms in English, they also did not know how to read mathematical symbols in English. This causes students to have no understanding of the material they are studying. From the results of the interview also, they admitted that they were afraid to present in English because they were afraid of mispronunciation and did not understand mathematical terms in English.

This condition is further complicated by the lack of a learning system that students have, especially because of the Covid 19 pandemic, where the lecture system uses an online system so that there is limited time and space for lecturers and students to discuss learning material [6]. E-learning learning is a learning resource that has an important role to support the current learning process where students can use the internet easily wherever they are [7]. With e-learning the teaching and learning process can be done remotely without having to meet face to face. Researchers feel the need to use e-learning by using a learning model that can know Student's achievement and Student's preferences in English Mathematics lectures.

In the emerging education system technology, it is necessary to have an e-learning system that is able to accommodate the problems of different characteristics of students, which can understand the preferences of students and strive to provide / deliver content and use methods that are in accordance with the characteristics of students, which is referred to as learner models in the form of relevant information about users related to personalization or learner models. This is a personalized learning process or a learning model using an e-learning model with adaptive theory information (Elita) which is supported by an adaptive learning system. E-learning model with adaptive information theory (Elita) is adaptive system model, which is adopted from Brusilovsky and Maybury [8,9] and describes the adaptive system model, as shown below:

![Figure 1. Adaptive Elearning System Model.](image-url)
The adaptive e learning system model uses the TPACK approach as follows:
1. The system displays the front page where from this page the user must be able to log in and get access information by online media (Technology)
2. When the user logs in as a student, the system provides a list of questions (questionnaire) to reveal the user's learning attitude. (Pedagogical)
3. Users will be directed to a learning model that features audio and video elements for their presentation (Technology)
4. Users will be directed to learning materials that will display learning materials accompanied by files (Content)
5. At the end of the learning material the system will display a test to evaluate the knowledge attainment of students' achievement

This Elita model provides learning material with a difficulty level according to the user's ability, and how to present the learning material according to user characteristics. Thus, the Elita model is expected to be able to change its actions to provide appropriate learning content and pedagogical methods for each student. Elita's model in this study is based on the “learner property description” which is called the user model or student model so that it can make adaptations. In other words, the adaptive learning system aligns EFM material and learning methods with the learner model. In other words, the e-learning system with the Elita model adapts its appearance to variations in user characteristics. The process of building a user model is generated from the process of collecting user profile information which is categorized as follows: 1) Student's achievement, is information on the results of student knowledge in the learning process at EFM. The results of this achievement can be seen from the acquisition of test scores given by Elita's model to students. 2). Student's preferences, are information on a structural concept about student preferences in the EFM learning process with the Elita model. These preferences are students presenting EFM learning materials (content, assignments, etc.) using the support of adaptive hypermedia system components (text, video, voice notes, etc.) so that student makes a presentation tailored to his level of knowledge and other preferences. In order to improve the development of EFM courses, the author tries to make field notes and related interviews get profile information of Elita's model users in categorized lectures, in Student's achievement and Student's preferences in English for Mathematics courses.

2. Methods
This research was a quasi-experimental research with a pre-test and post-test group design. In this design, test were carried out twice, namely before the experiment and after the experiment. Observations made before the experiment are called pre-tests and observations made after observations are called post-tests [9]. The population in this study were students of Mathematics Education at Universitas Negeri Padang who took the English for Mathematics course in the 2019/2020 academic year which consisted of two classes, namely Mathematics Educators class A and B. The sample in this study was selected by cluster random sampling, namely A class. Data collection through achievement tests of English mathematics knowledge which was carried out before and after the action, and student presentation data

3. Results and Discussion
The lecture process using the Elita model in the English For Mathematics course runs even though there is a slight signal interference but it can be resolved. Teaching materials have been given by the lecturer before the learning process in the offline class. Class discussions through chat forums via Whatsapp or video conferencing conducted via mobile phones. The collection and discussion of student assignments is directly controlled via the lecturer's email. Online presentation is also carried out to see students' understanding of the material. The presentation process can be seen in Figure 1.
Figure 2. Activities for Lecturing English for Mathematics with Whatsapp Chats

Based on the research that has been done, a description of the data on the achievement of student knowledge is obtained as shown in Table 1 below.

Table 1. Descriptive Statistics

|              | N  | Mean   | Std. Deviation | Max  | Min  |
|--------------|----|--------|----------------|------|------|
| Pre-Test     | 43 | 74.53  | 6.97051        | 90   | 65   |
| Post-Test    | 43 | 82.75  | 6.24235        | 95.5 | 70   |

From Table 1, it can be seen in the pre-test that the highest value is 90.00, the lowest value is 65.00, average 74.53, and the standard deviation 6.97. On the post-test score, the highest score is 95.5, the lowest score is 70.00, the class average 82.75 and the standard deviation is 6.24. The use of the Elita Model in English for Mathematics courses has been developed, it’s showed that the Elita model is suitable for use in learning. From the description of the research data for the achievement of student learning achievement in EFM, it can be seen that the acquisition of scores that tends to increase when the post-test is carried out shows that there is a positive impact that can increase student knowledge achievement. It can be seen from the smaller standard deviation of the pre-test score. This shows that the level of attainment of student knowledge is better and tends to be evenly distributed in EFM course in A class. According to researchers, this is also supported by the ease with which many lectures use WhatsApp and video conferencing. The positive impact, Students felt that they were ready before lecturing so that when online lectures take place students are actively involved in discussions and ask questions that they did not understand. Whatsapp chatting and video conferencing are among the favourite means of online students. Students are very active and have the confidence to communicate in English through this means. This causes students to improve their skills in speaking English in line with the opinion of Abdel-Rahman Al-Eiadeh1, et al [11] which states that the goal of learning English is mastery of language skills, while knowledge of language regulations is the supporter. Chat and video conference can be held at any time without having to think about limited space and time.
4. Conclusion
The use of the Elita model was effective in terms of student achievement. There are many conveniences that can be utilized by using online in the learning process, namely class discussions are not hampered by limited space and time because it can be done through WhatsApp chat forums or video conferences, student assignments presentations are also directly controlled by the lecturer, and online presentation can be done on student preferences capabilities.

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