Using by E-Learning with Information Theory Adaptive Model to Increase Self-Regulated Learning Students

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Abstract. This study aims to describe the influence of Elitas' model on self-regulated learning Students and student learning outcomes at Semester January –June 2020 of Mathematics Education Study. The type of research used in this research was descriptive research with the design of one shot case study. The subjects in this study were students who were English for Mathematics course in the scope of 72 people in the FMIPA UNP. The instrument that will be used in this study is in the form of learning outcomes test and student self-regulated learning questionnaire sheets. Analysis of the data used are percentage analysis and to test hypotheses used t-test. The results showed by student learning independence score has a mean of 88.72 and high percentage of independence in using knowledge and experience was 79.17%. Based on student learning outcomes, it was a significant effect of in terms of there are differences in student learning outcomes before and after using the Elita model in EFM lectures.

1. Introduction

English language skills are required in Mathematics courses, this is because many textbooks used in the lecture process use mathematical terms in English. In particular, English for Mathematics is used in: (1) mathematics education literature, (2) articles on mathematics education, (3) articles in mathematics education communicating forums. The English for Mathematics course is one of the compulsory courses taken by UNP Mathematics Education Study Program students. Thus mastery of the English language is very important to achieve as a result of the current learning process. Various efforts have been made by the Mathematics Education Department to improve students' ability to speak English, to support the internationalization program.

However, the conditions described above are still far from expectations when seen from the Mathematics Education students of Padang State University who took English for Mathematics (EFM) courses in the Jan-June 2020 semester. Students do not have a big responsibility in solving lecture problems. For example, from the results of the EFM assignment given by the lecturer, it was found that out of a total of 72 students, only 19 students completed the assignment on time, this means that students do not have a disciplined attitude in carrying out the assignment given by the lecturer, students do not have their own learning initiative, they are waiting, instructions or assignments from the lecturer in learning; some students are still unable to monitor, organize, and control learning, still seem to learn as needed, if there is a lecture. Learning independence for students in EFM lectures cannot be separated from independence which is still the focus of problems in the world of education in Indonesia which is quite concerning. The results of research show that students' learning
independence can be said to be in the low category. It is alleged that the low independence of learning occurs in most schools in Indonesia.

If the problems described are allowed to continue, it will have a negative impact on the aspects of learning behaviour of mathematics education students in the future, it is necessary to make efforts to improve student learning independence. There are three characteristics contained in the meaning of independent learning, namely: (1) Individuals design their own learning according to the needs or goals of the individual concerned; (2) Individuals choose a strategy and carry out their learning plan; then (3) Individuals monitor their own learning progress, evaluate their learning outcomes and compare them with certain standards. In EFM lectures, student learning independence has appeared in the face of assignments in the form of open projects. When students face tasks like the one above, due to the efforts of EFM lecturers and the provision of learning resources in training students' independent learning, they are faced with an abundant source of information. In such conditions the student must have his own initiative and intrinsic motivation, analyze needs and formulate goals, select and implement problem-solving strategies, select relevant sources.

One of the steps that can be pursued is the application of a learning model that provides open opportunities for students to learn independently. This learning model must be able to optimize student learning independence; make students trained to learn independently; streamline the student learning process; and able to keep pace with the rapidly developing knowledge and technology. With sufficient English language skills, scientific accessibility will be 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. Scientific development in the era of industrial revolution 4.0 is accelerating, especially in March 2020 because of Covid 19, the Ministry of Education and Culture officially announced that all teaching and learning activities carried out in class were stopped and replaced with learning and teaching activities from home using internet / online assistance (In Network). Such conditions require lectures to use various applications both via Smart Phones and laptops. Students are directed to keep learning by taking classes according to their usual schedule by using various applications, be it e-learning, Google Meet, Google Classroom or others.

Basically, long before the Covid-19 pandemic appeared the world had entered the era of the industrial revolution 4.0. All activities are faced to be able to adapt and use technology. The Covid-19 pandemic requires the world of education to immediately be able to use technology in learning without having to come face to face, between education and students in one place. Lots of access can be used by lecturers in managing and running lectures without having to be confused by space and distance. Online lectures or online-based lecture systems also called e-Learning is a lecture process using information and communication technology, in this case internet.

In the emerging education system technology, it is necessary to have an e-learning system that is able to accommodate the problems of different student characteristics, which can understand the preferences of students and try to provide / deliver content and use methods that are in accordance with the characteristics of students, which is referred to as E - adaptive learning. Lecturers have made efforts by administering assignments and projects from learning resources that can be obtained through online sources. One important effort to take is to develop a learning model for the English for Mathematics course using the Padang State University e-learning application by adding adaptive information. Lecturers prepare and design lectures that make it easier for students to understand the material being studied. The adaptive e-learning system can provide learning material with a level of difficulty according to student abilities, and how to present learning material according to student characteristics. In other words, the learning model with the e-learning system which is also called the Elitas’ model can adapt its appearance to various variations of student characteristics, so that it has high learning effectiveness. The main characteristic of the learning model with Elita's adaptive system is that the learning process can be adjusted according to the level of knowledge acquired by students. This system consists of three basic modules: domain model, student model, and adaptation module as shown in Figure 1 as below.
There are three components interact to adapt different aspects of the learning process, adapt content according to student knowledge; adapting the content of EFM lecture presentations to suit the media (for example: Whatsapp, Video Conference); adapting teaching strategies; modify the sample and link selection, and recommend appropriate hyperlinks.

In an adaptive e-learning system based on student characteristics, a student can be given a presentation tailored to his level of knowledge and learning characteristics. In this Elita model a student can be given material that is tailored to his abilities and knowledge. Thus each student will get a presentation of learning material in accordance with the trend characteristics, what is concerned is the student's learning independence. In this way it is hoped that what is obtained during the learning process can be optimal. So that with the limited space for lecturers to convey material and monitor students one by one, it is imperative that students be able to grow and increase learning independence in itself. As stated Zimmerman [6] argues that students who have independent learning, each behaviour provides initiation and direction for his efforts to gain knowledge and skills. Students who have independent learning do not only rely on the ideas of lecturers, parents or other learning agents.

2. Methods
This research is categorized into qualitative research with one shot case study design[7]. The problems that can be researched and investigated by this descriptive qualitative research refer to a quantitative, comparative study. The population of this study were all active students of the mathematics education study program who took EFM courses, with 72 active students consisting of two classes as research subjects. The instruments used in this study were in the form of a learning independence questionnaire, and an EFM learning outcome test. The instrument in this study used a Likert scale model attitude. The Likert scale is used to measure students' attitudes, opinions and perceptions about social phenomena that have been determined specifically with the measured variables translated into indicators: 1) Confidence in the results of work, 2). Initiative in learning, 3) Responsible for tasks, 4). Setting target, .5) Independence in making decisions, 6). Independence in using knowledge and experience,7). Learning strategy. The data analysis used is descriptive analysis for independent learning with percentage techniques, and the EFM learning outcomes test is used to test the difference before and after giving Elita's learning model by using t-test

3. Results and Discussion
The following are the results of distributing questionnaires for the learning independence of students who take EFM courses in Mathematics Education study program. Based on the results of the analysis using the percentage technique, it is known that the measured student learning independence, the result is that the student learning independence score has a mean of 88.72 and a standard deviation of 11.36. The questionnaire results data are grouped into three categories, namely the category of high student learning independence with the criteria $\bar{X} + 1 \cdot s$, namely the score above 100.08, the category of student learning independence is medium with the criteria $\bar{X} - 1 \cdot s \leq X \leq \bar{X} + 1 \cdot s$, namely the score from 77.36 to 100.08, the category of learning independence is low with the criteria $\bar{X} < \bar{X} - 1 \cdot s$, that
is, the score is less than 77.36. So seen from the criteria for the independence questionnaire, it is in moderate criteria.

When viewed from the indicators that show the number of students who answered agree or were able to do based on the questionnaire item, it was the indicator of independence in mastery and knowledge and experience, as much as 79.17%. The number of students who answered the statement items on the Learning Strategy indicator was also shown from the results of the questionnaire showing that as many as 36.72% of students strongly agreed to show the Learning Strategy attitude and as many as 59.38% of students agreed to do Learning Strategies when the mathematics learning process was in progress. The indicator that shows that some students agree to do this is the indicator of independence in making decisions, amounting to 47.92%. The statement items on all indicators generally agree with a percentage above 42.5%. Independent learning can be carried out by students if the student has confidence in the results of the work with an agreed answer of 51.25%, because the attitude of independence is generally influenced by the student's self-reliance.[8][9]. Self-confidence provides a positive view of students on their ability to increase learning independence.

Self-confidence is one important factor in achieving independent learning in students. Students who have self-confidence will be sure of the various decisions they take to achieve the learning outcomes they get. If students do not have self-confidence, then they cannot develop an independent learning attitude in themselves. Therefore, students who have self-confidence are generally able to have confidence that whatever steps taken in their learning activities are able to provide satisfactory results later[10]. If seen from the average questionnaire score which reaches 2.96 it means that students many provide answers that agree on each item of the questionnaire statement.

![Figure 2. EFM Student Learning Independence](image)

Based on the research that has been done, with the help of excel, a description of the student's knowledge attainment data is obtained as shown in Table 1 below.

|          | N  | Mean | Std. Deviation | Max  | Min  |
|----------|----|------|----------------|------|------|
| Pre-Test | 72 | 72.71| 5.17           | 85.00| 60.50|
| Post-Test| 72 | 83.38| 6.14           | 95.50| 70.00|
From Table 1, it can be seen in the pre-test that the highest value is 85.00, the lowest value is 60.50, on average 72.71, and the standard deviation 5.17. On the post-test score, the highest score is 95.5, the lowest score is 70.00, the class average 83.38 and the standard deviation is 6.34. The use of the Elita Model in English for Mathematics courses has been developed [11] shows the results 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 English courses for mathematics. The above results are also obtained from the results of statistical tests with ui-t, it is necessary that the pre-test and post-test results are normally distributed with homogeneous variance, like the following table:

### Table 2. Tests of Normality

| Type       | Shapiro-Wilk |
|------------|--------------|
| Score      | Pretest      | .973          | 82       | .084      |
|            | Posttest     | .984          | 82       | .395      |

* *. This is a lower bound of the true significance.

Based on the Table 2, the significance value (p) in the Shapiro-Wilk test is 0.084 and 0.395 (p> 0.05), so based on the normality test of Shapiro-Wilk the data is normally distributed. Furthermore, the homogeneity test is carried out, it is obtained:

### Table 3. Test of Homogeneity of Variances

| Test of Homogeneity of Variances | Levene Statistic | df1 | df2 | Sig.  |
|---------------------------------|------------------|-----|-----|-------|
| Score                           | Based on Mean    | 1.976| 1   | 162   | .162  |
|                                 | Based on Median  | 2.023| 1   | 162   | .157  |
|                                 | Based on Median and with adjusted df | 2.023 | 1 | 160.837 | .157 |
|                                 | Based on trimmed mean | 2.106| 1 | 162 | .149 |

Based on the Table 3 the significance of homogeneity of 0.162 (≥0.05) shows that the Pre-test and Post-test groups are homogeneous, with a Levene Statistic of 1.976. Because they are met, the t test is carried out with the following results:
Table 4. Paired Samples Test

| Paired Differences | t   | df | Sig. (2-tailed) |
|--------------------|-----|----|----------------|
| Mean               | Std. Deviation | Std. Error | 95% Confidence Interval of the Difference | Lower | Upper |
| Paired Differences |     |     |                |       |       |
| Pretest – Postest  | -11.57661 | -9.97095 | -26.701 | 81 | .000 |

Based on the Table 4, the Sig. (2-tailed): The probability value / p value of the T Paired test: Result = 0.000. Meaning: there is a difference between the pre-test and post-test scores. Because: p value > 0.05 (95% confidence). This means that there are differences in student learning outcomes before and after using the Elita model in EFM lectures. According to researchers, the positive impact was that students felt they were ready before lecturing so that when online lectures took place students were actively involved in discussions and asked questions they did not understand. Students are very active and have the confidence to communicate in English. This causes students to improve their skills in speaking English in line with the opinion of [12] which states that the goal of learning English is mastery of language skills, while knowledge of language regulations is the supporter. The results of this study are in line with the results of research conducted by [13], which states that the application of e-learning-based mathematics can create an effective learning process.

4. Conclusion
Student of English for Mathematics course in mathematics department have student learning independence score has a mean of 88.72 and percentage of independence in using knowledge and experience was 79.17%. The average questionnaire score which reaches 2.96 it means that students many provide answers that agree on each item of the questionnaire statement. The use of the Elita model was effective in terms of there are differences in student learning outcomes before and after using the Elita model in EFM lectures. There is a positive impact that can increase student knowledge achievement

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