Analysis of Student Activities in E-learning Based on Multiple Intelligences

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Abstract. The concept of e-learning provides more intensive interaction between lecturers and students, both in the classroom and outside. E-learning can increase student interest in optimizing the potential of multiple intelligences. Incorporating Multiple Intelligences into e-learning strategies provides a level of flexibility in how students can carry out their learning and provide a collaborative and interactive environment. This study aims to analyze student activity in e-learning based on multiple intelligences. The method used is descriptive qualitative by analyzing student activities in e-learning based on the classification of 8 Multiple Intelligences. The results of this study stated the percentage of students based on multiple intelligences obtained the highest percentage value of 38% Naturalist intelligence, 24% Musical intelligence, 17% Visual Spatial intelligence, Logic mathematical intelligence and Interpersonal intelligence 7%, Kinesthetic intelligence 4%, Intrapersonal intelligence 3%, and Linguistic intelligence 0%. Analysis of e-learning activities obtained the highest frequency by visua-spatial intelligence with a percentage of 82%, dominant naturalist intelligence possessed by students in the class has a percentage of 74%, then intrapersonal intelligence as much as 63%, kinesthetic intelligence 53%, interpersonal intelligence 47%, musical intelligence 31%, and logic-mathematic intelligence 29%. Because in this class the dominant type of naturalist intelligence, e-learning is declared suitable to be applied because this intelligence is included in the active category of activities in e-learning.

1. Introduction

Various methods and learning strategies continue to be improved to provide global demands. Indonesia must introduce and apply the concept of education that revolves in various activities. Program variations can create a good atmosphere of student development [1]. Along with the rapid development of information technology, the need for a concept and mechanism of teaching and learning based on Information Technology becomes inevitable. This concept, which became known as e-learning, has an effect on the transformation of conventional education into digital form, both in content and system, which is bridged by internet technology. The concept of e-learning gives the possibility of more intensive interaction between lecturers and students, students and students in the classroom and outside the classroom [2].

According to Wijaya (2012) E-learning is a learning process carried out through a network, this means that e-learning enables the delivery of teaching materials to students using media with information and communication on computers and internet networks or intranets. With e-learning can be done anytime and anywhere, so that the learning process can be effective and efficient [3]. This is also in accordance with Wawan Setiawan's statement that Learning is no longer limited by space and time, anytime and anywhere, as long as it is connected to the internet, the learning process can be carried out. Student
performance through e-learning is to show the ability of e-learning in integrating the learning process. Electronic communication combined with the development process needed to place a learning in the e-learning format facility that is integrated into the structuring of the content, therefore there is a positive change in student performance with the presence and empowerment of e-learning [4].

Humans must be born with abilities and strengths that differ from one another, as well as the intelligence they have. Intelligence must be related to cognitive abilities possessed by individuals. Compound intelligence is the ability to solve and solve problems, in addition to this intelligence is also interpreted as a person’s expertise in thinking, acting and behaving in accordance with what they face [4]. According to Sutisna in Prasetyo [5] every human being has a special way of understanding, understanding, and learning and all of that is due to the intelligence of each different individual. This difference must be appreciated because indeed every human being is born with different strengths and weaknesses between one individual and another individual. Howard Gardner in Tangwanawit et.al [6] suggests that everyone has different types of intelligence to different levels and that they operate together in a regulated manner. This theory shows that although different intelligences tend to be stronger in some people, each person has the capacity to activate all intelligences and in different situations or combinations of intelligence can be used.

Eight intelligence according to dr. Howard Gardner in the book Munif Chatib [7] is linguistic, logico-mathematic, visual spatial, musical, kinesthetic, interpersonal, intrapersonal, and naturalist. 1) Linguistic: the ability to use words and language to read, write, listen and speak. In learning, this person likes to debate, write poetry, and play word games and like to tell stories. 2) Logic-Mathematic: the ability to explore patterns and relationships, in addition to conducting experiments for self-understanding, also likes to estimate, ask questions, and enjoy well-organized tasks. They use numbers and are able to recognize abstract patterns in their studies. 3) Visual Spatial: feel and imagine the world of images and space accurately, having the ability to visualize objects and spatial dimensions. These people can enjoy learning by watching videos, drawing and scribbling, navigating and understanding graphic presentations. 4) Musical: the ability to recognize tone and sound patterns, they are people who have high sensitivity to rhythm, tones, beats and patterns in melodies, they listen to music while learning or reading. 5) Kinesthetic: this intelligence comes from gestures; the ability to control physical motion and wisdom using movement appropriately. In terms of learning activities, they prefer direct learning and physical activities as their learning style. 6) Interpersonal: Individuals have many friends and like to be involved in social activities. They have genuine empathy for the feelings of others and may be good leaders. His learning style is through participating and sharing in a teamwork environment. 7) Intrapersonal: someone who is related to his own feelings and believes in solitude, has a creative and reflective mind in responding to strong opinions and controversial issues. They learn by doing self-study projects and self-reflection. And 8) Naturalists: the ability to relate to nature, tend to feel natural patterns and find relationships between living organisms as well. These people learn by studying natural phenomena and how they work [8].

Figure 1. Multiple Intelligences Model
Multiple Intelligent Theory [9] states that each student has different talents with different dominant. The most important aspect is that from more dominant developments, the results show individual progress. In addition, each student can have more than one dominant type of intelligence. The Multiple Intelligences Model is shown in Fig. 1. Learning through e-learning by knowing the multiple intelligences of students has been done by Dewi Andayani, who stated that e-learning can increase student interest in optimizing the potential of multiple intelligences. Visual spatial intelligence learns more optimally by seeing and reading, kinesthetic intelligence learns by hand using computer equipment when accessing e-learning, interpersonal intelligence through group discussions and class discussions, intrapersonal intelligence through independent learning through e-learning, linguistic intelligence through discussion and quizzes, musical intelligence through the use of animation [10]. The real effectiveness of e-learning applications lies in the recognition by educators and students that everyone has the strengths and weaknesses of learning. In general computer skills and special education, there is not much emphasis on the importance of developing e-learning applications that effectively serve all types of people [11].

The use of e-learning with multiple intelligences approach has been widely applied in learning. E-learning has become an important component of off-campus university education in recent years, but often students in e-learning still get the delivery of online print-based material, which is supported by elective audio lectures with several supporting elements such as formative tests and communication tools. The pedagogical effectiveness of e-learning is done by identifying content design approaches using understanding that is compatible with various intelligences [12]. The e-learning framework formed in creating content that is adapted to multiple intelligences, is felt to be very useful for instructional designers in learning [13]. A design that focuses on e-learning and learning profiles based on types of intelligence has also been done by T. Kaewkiriya, N. Utakrit, and M. Tiantong [14]. Furthermore, there is research to find out student feedback and types of student intelligence related to learning outcomes through e-learning [15].

Survey findings show that students with spatial visual intelligence and interpersonal intelligence get more benefits [11] [16] and prefer the use of e-learning, compared to linguistic, logical mathematical, kinesthetic and intrapersonal intelligence. Learning activities tend to be most effective when the preferred learning mode is combined with various activities related to learning styles based on Multiple Intelligences. The integration of Multiple Intelligences in e-learning strategies provides a level of flexibility in how they conduct their learning, a collaborative and interactive environment [11]. Based on the results of e-learning that have been done in previous studies, by analyzing it in accordance with the dominant multiple intelligences in the classroom, the researcher wants to analyze student activities in e-learning based on multiple intelligences. With student activities in using e-learning which includes courses, assignments, and quizzes.

2. Method

This research uses descriptive quantitative method by analyzing student activities in e-learning based on the classification of 8 Multiple Intelligences, namely Linguistic, Logic-Matematic, Visual-Spatial, Musical, Interpersonal, Intrapersonal, Kinesthetic, and Naturalist. The subjects of the study were Electrical Engineering students of the Faculty of Engineering UMK class of 2018/2019. The subject is known in advance of multiple intelligences, using online questionnaires. To divide the level of student activity, categories are used as shown in table 1.

| Value Interval | Category     |
|----------------|--------------|
| 85%-100%:      | Very active  |
| 65%-84%        | Active       |
| 55%-64%        | Quite active |
| 35%-54%        | Less active  |
| 0%-34%         | Not active   |
Data on student activities were analyzed quantitatively by calculating the percentage of activities using the formula [17]:

\[ \%A = \frac{F}{n} \times 100\% \]

\% A = percentage of activity ; F = activities frequency ; n = total of activities

3. Result and Discussion

This research resulted in multiple intelligences data obtained from online questionnaires using googleform application, with answer choices using Likert scale. This online questionnaire consists of 9 pages with the first page containing the biodata of respondents (Figure 2), and the second to eight pages are questionnaires with eight intelligences, with order A (Linguistic intelligence), B (Logic Mathematic intelligence), C (Visual Spatial intelligence), D (Kinesthetic intelligence), E (Musical intelligence), F (Interpersonal intelligence), G (Intrapersonal intelligence), and H (Naturalist intelligence), as shown in Figure 3.

![Figure 2. Display on the first page of the multiple intelligences questionnaire](image1)

![Figure 3. Display questionnaire with 8 pages with 8 types of multiple intelligences.](image2)
From filling out the questionnaire by students, the results obtained as shown in Figure 4.

**Figure 4.** Results of Multiple Intelligences of Electrical Engineering students in class 2018/2019

Based on Figure 4, multiple intelligences students get the highest percentage value in Naturalist intelligence 38%, Second place in Musical intelligence 24%, the next sequence is Visual Spatial intelligence 17%, Logic-mathematic intelligence and Interpersonal intelligence 7%, Kinesthetic intelligence 4%, Intelligence intelligence Intrapersonal 3%, and Linguistic intelligence 0%.

Of the several students who are known to have the type of intelligence they have, then choose one student at random from each type of intelligence. Furthermore, analyzing the results of student activities in e-learning that has been carried out for one semester in the even semester of 2018/2019. Identification of activities in e-learning, seen in the activities: Course (view courses, resource view, and URL view), Assignment (view and upload assignment), and Quiz (view and attempt quiz).

E-learning activities are carried out using e-learning with a domain that is already owned by the campus with the URL sunan.umk.ac.id. All activities carried out by students can be known from the report activity that has been stored in e-learning, as shown in Figure 5.

**Figure 5.** Report activity of e-learning

From the results of the report activity, then calculate the total activity that has been done during one semester, by selecting a sample of students with multiple intelligences that are dominant in the student, as shown in table 2.
Table 2. Student activities in e-learning based on multiple intelligences

| Code | Intelligences    | Percentage Activities e-learning (%) | Category     |
|------|------------------|--------------------------------------|--------------|
| A    | Linguistic       | 0                                    | Not active   |
| B    | Logic Matematic  | 29                                   | Not active   |
| C    | Visual Spatial   | 82                                   | Active       |
| D    | Kinestetic       | 53                                   | Less active  |
| E    | Musical          | 31                                   | Not active   |
| F    | Interpersonal    | 47                                   | Less active  |
| G    | Intrapersonal    | 63                                   | Quite active |
| H    | Naturalis        | 74                                   | Active       |

Of all the activities that have been carried out in e-learning, the highest percentage is obtained by students with visual-spatial intelligence with a percentage of 82%, while the naturalist intelligence that is dominantly owned by students in the class has a percentage of 74% with the second sequence of the frequency of activities carried out during learning, the next sequence was intrapersonal intelligence by 63%, kinestetic intelligence by 53%, interpersonal intelligence by 47%, musical intelligence by 31%, and logic-mathematic intelligence by 29%. The order of total of e-learning activities can be seen in Figure 6.

Figure 6. Student activities in e-learning based on multiple intelligences

Total student activity in e-learning can be seen that students with spatial visual intelligence have active categories in e-learning, because this type of intelligence is able to perceive the world of images and space accurately, has object visualization and spatial dimensions that better understand graphic presentations. This is consistent with the statements of Paul McNamee et.al [7] and Kemalatha Krishnasamy et.al [14] that e-learning is preferred by visual spatial intelligence. However, with the dominant class with naturalist intelligence, e-learning in this class is already suitable to be applied because this intelligence is included in the active activity category in e-learning. Although in the second sequence of e-learning activities with a percentage difference of 8% of spatial visual intelligence that ranks first, e-learning in this class needs additional learning strategies that are more related to naturalist intelligence, namely the tendency to study natural phenomena and ways of working.

4. Conclusion and Suggestion

Based on the results of research and discussion, it can be concluded that, the percentage of students based on multiple intelligences obtained the highest percentage value of 38% Naturalist intelligence, 24% Musical intelligence, 17% Visual Spatial intelligence, Logic-mathematic intelligence and Interpersonal intelligence 7%, Kinesthetic intelligence 4 %, Intrapersonal intelligence 3%, and linguistic intelligence 0%. Analysis of e-learning activities obtained the highest frequency by visuospatial intelligence with a percentage of 82%, dominant naturalist intelligence possessed by students in the class has a percentage of 74%, then intrapersonal intelligence as much as 63%, kinestetic
intelligence 53%, interpersonal intelligence 47%, musical intelligence 31%, and logic-mathematic intelligence 29%. Because in this class the dominant type of naturalist intelligence, e-learning is declared suitable to be applied because this intelligence is included in the active category of activities in e-learning.

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