

ORIGINAL ARTICLE

HUMAN FACTORS ANALYSIS OF ONLINE LEARNING PROCESS FOR STUDENTS ON SELECTED INDONESIAN CAMPUS (A PRELIMINARY STUDY)

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ABSTRACT

The fourth industrial revolution is impacting the learning industry to become online learning, especially in Indonesia. Online learning provides benefits in that it can be cheaper, takes less time, can be self-paced, and provides an equal quality of education for students in rural areas. A total of 60 Indonesian college students on selected campus (age $20 \pm 0,36$ years old) who joined the Computer Simulation class in the third grade participated in this study. They are divided into two classes, an online class using Moodle software and a physical class, then observations are made. This study aims to obtain preliminary data to then research what human factors influence Indonesian people that constrain students from successful participation in online learning. The results show that there are three aspects of implementing online lectures in Indonesia: rules, usability and cognitive aspects. Besides, quality of place is an environmental factor that cannot be controlled.

Keywords: human factors, online learning, Indonesia

INTRODUCTION

Geographically, Indonesia consists of many islands, which creates the need to spread education evenly. Students who live in rural areas also need a better chance to have access to lecturers as those who live in big cities, and even opportunities for global collaboration^{1,2,3}. Online learning can be the solution as a learning method without walls or class limitations; thus, students can interact with lecture materials, other students or lecturers electronically, wherever they are⁴. As long as the students have an adequate internet connection and access, they can study anywhere.

Education is expensive, but the online learning system offers a chance to overcome that⁵. To counter the dense level of traffic in the big cities in Indonesia, online learning systems offer many benefits, making education more flexible in that students do not necessarily have to come to campus. College students can access the lecture materials from home, thus avoiding time and transportation costs. The traffic in big cities will decrease, and education institutions can save building maintenance costs through offering online learning.

As a developing country, Indonesia has been developing its online learning system for the past few years, especially at the college level. Apart from various benefits promised by the online learning system, the system itself is still in the

initiation process and is newly developed in Indonesia, so it has yet to achieve the best pattern for implementation in all colleges. Cultural factors and the unique behaviour of the Indonesian people become an interesting variable to be analysed further; therefore, this preliminary study is needed first.

Human factors are suspected as aspects that will influence the success of an online learning system. As a definition, human factors refers to the study of how to choose operators, jobs, machines, and suitable environments in regard to human limitations and capabilities⁶. Thus, the results of this preliminary study are adjusted to the Indonesian people's capacities and limitations when conducting and participating in online lectures.

The purpose of this study is to obtain preliminary data that can be used for future research to analyse what human factors influence the success of an online learning system in Indonesia and what is the best practice. Other studies have been conducted to discuss the best practice in online learning systems, but they have not specifically explained the technical steps involved¹. Through this preliminary study, obstacles, responses, behaviour, and adaptation patterns of college students who studying online can be identified. This identification delivers analysis through three basic aspects: (1) Rules conducted in online lectures, (2) Usability aspects in online lectures, and (3) Another

cognitive aspect. So far, there is no best or standard rule regarding the online learning system in Indonesia. These rules include scheduling online learning, the mechanism for delivering lectures, how to measure the achievement of lectures, etc.

METHODS

Observation of online learning was conducted with college students in the Computer Simulation class. This class was chosen because the lecture material was complete, including theory and quantitative math questions, so it is hoped that this would facilitate comprehensive observation. Three parallel classes were involved in the observation process, with a total of 60 participants. The comparison between males and females was 37.84%:62.16%, with an age range of $20 \pm 0,36$ years old. Participants involved did not have any experience whatsoever with online lectures or online learning systems.

Participants were divided into two classes: an online class and a physical class. The online class would receive lecture materials via Moodle software assistance, and the physical class would get materials by slides and whiteboard. Each class was given the same outline lecture materials. The participants' grouping was done by considering the GPA. Participants with a similar GPA were distributed in a different class to evenly distribute the academic ability of both classes. At the end of class, all participants were quizzed about the lectures that were presented to them.

RESULTS

According to the purpose of the study, the results of the observations are grouped into three aspects: rules, usability, and cognitive aspects. The following results analysis is obtained through the observation and literature review.

Rules in Online Lectures

Before starting online lectures, students need to know the rules regarding preparation and class schedules so the lecture can take place in an orderly manner even there is no face-to-face meeting between lecturers and students.

1. Presence Mechanism

The presence mechanism is the first thing students must understand before starting online lectures. Presence can be established through the login into the online learning software, or through other applications such as the WhatsApp group or Google Classroom. The advantage of using the software is that it will specifically

record the time of the login. It should be noted that the username and password of a student can be given to someone else since the lecturers are not able to determine whether it is really the student who logged in. As was found in this study using Moodle software, the lecturer cannot know clearly whether the username is being used by the student or not.

2. Briefing Before Online Lectures

Through observation, it was determined that the online class students need a briefing in a physical class setting to explain how to use Moodle so they can use every menu inside. Furthermore, lecturers need to hold the rules so that participants can allocate their specific time and fully concentrate during online lectures. This is because there is a possibility that participants are not able to properly allocate their time and location, especially for online learning. For example, students took online classes in noisy places, and they participated in online lectures as part-time activities while working on other jobs or on a trip. Although the principle of the online lecture is flexibility in access, students need a conducive environment to support online learning activities. These matters must be addressed in the online lecture rules briefing so the quality of learning can be maintained. One example of a rule that can be established is that if a participant is in a noisy room, the participant should use a headset to minimize distractions while the lecture is in progress.

It is difficult to control environmental factors that affect online learning quality for every student. In this case, the physical class has more advantages in that environmental distractions can be minimized through using a class boundary. Moreover, when in a physical class, students directly experience the presence and motivation of the lecturer. This is not found in online lectures. However, even though environmental factors cannot be controlled in online lectures, the lecturer must be able to deliver the material effectively in the face of the personal and environmental factors that can decrease the success of online learning⁴.

Another aspect that can be agreed upon in the online class briefing is that students must have adequate internet access. This is because convenience in online learning is influenced by fluency in accessing the lecture material. Furthermore, ease of accessing the material will enable the students to better understand the lecture.

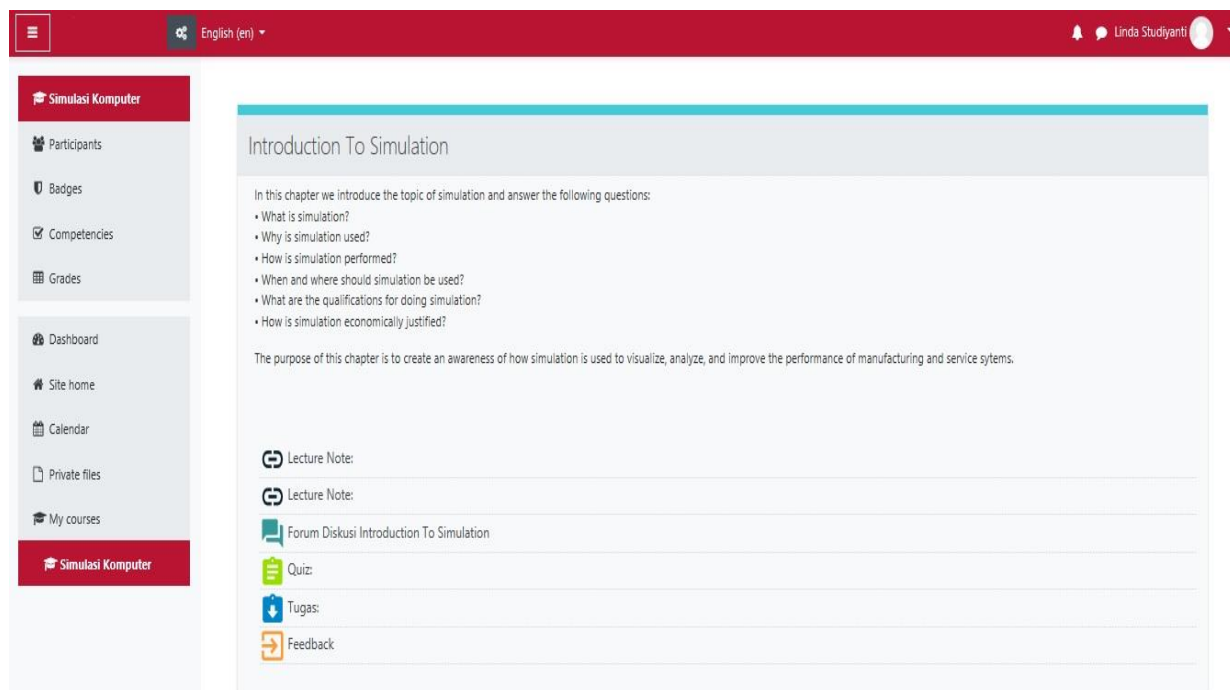


Figure 1: Dashboard display of Moodle software for Simulation Class

3. Online Lecture Schedule

When online lectures start, students need to know the rules regarding online learning schedules, which include provisions for when students can access a lecture/quiz and when the system will be closed. There are two mechanism choices for online lecture scheduling. The first one, the online lecture schedule, is determined by the lecturer. The second one is that students are free to log in during a certain period of time.

First, the schedule for participants to log in to the online lecture is determined as a specific time or hour, so exiting the schedule would result in their absence in the system. The advantage of this type of scheduling is that the participants would be more disciplined in participating in the online lectures because late login can be monitored and ease lecturers to schedule their time to make lecture material. However, the downside of this type of scheduling is that students have less flexibility in their time.

Second, the login time is not determined but given as a certain duration. This mechanism provides a convenient way for students to plan their time. For example, if the login duration is open for seven days, then the students have time flexibility to determine the login time. On the other hand, students should know for sure whether the lecturer has uploaded lecture material into the online class or not. Thus, this mechanism must contain a kind of notification for when the lecturer uploads new lecture material files. This method will only work if they are consistent and disciplined with the rules of online learning.

Technically, lecturers will have more convenience in maintaining online lectures with the fixed scheduling mechanism. However, this is contrary to a basic principle of online learning of having flexible time for students so they can adapt their capabilities and preferences according to their individual needs,⁷ and it causes the time factor to become a constraint again. Thus, while the second mechanism is closer to the needs of Indonesian students, it must be proven in future studies. Apart from the scheduling mechanism chosen, online lecture material must be accessible and available for download when students need it to learn and perfect their understanding.

4. Device

The device used for online learning must follow the learning outcome and meet the needs of students^{1,8,9}. The device in this study refers to equipment used to access online lectures, including laptops and mobile phones. Through the observation of online class using Moodle software, it was determined that the software cannot adjust the screen scale for phones, so the phone access quality is lower than laptops. To maintain online lecture quality, the device used for online learning must be a laptop. This provision was conveyed during the online lecture briefing. Also, it was found that despite an explanation regarding use of the device, some students still forgot or had reasons that forced them to use a mobile phone to access the online lectures. Situations like this cannot be controlled by lectures and can reduce the quality of online learning.



Figure 2: Student using a mobile phone to access online lecture

Usability Aspect in the Online Lecture Process

In participating in online lectures, students had many encounters with an interface, so the usability aspect of the interface needs to be analysed. Through observation, several factors were found related to usability aspects: language use, help or assistance button, lecture delivery methods and volume. A high degree of usability affects the level of satisfaction the students feel regarding the class, and as a result of that satisfaction, the students are motivated to increase their skill in learning⁷. This motivation is very needed in online learning because online class requires the students' self-awareness to plan their learning schedule and their discipline to follow the learning rules of the online lectures. Understanding the students' perception and experience of convenience in using an online learning tool can provide a good recommendation for implementing proper and effective online lecture rules⁷.

- *Language*

Language consistency is one of the usability aspects that was identified during observation. Moodle software, lecture slides, and quizzes are encouraged to use consistent language. For example, in this preliminary study, the lecture material was delivered through PowerPoint slides, which added a voice from the lecture and a cursor. The slide was shown in the English language, but the narrative voice from the lecturer was delivered in Bahasa Indonesia. This confused the students and affected their ability to comprehend certain concepts because they had difficulty relating the slide with the lecturer's explanation.

An advantage of using the online learning system was found to be that the students in the parallel class would get similar delivery. In Indonesia, one course can have 2-3 classes in one grade, and with that being the case, online lectures have the advantage of standardization for this

situation. Another advantage is the class capacity can be bigger than a physical class, which must consider class infrastructure and other conveniences.

- *Help or Assistance Button*

The observation found that the students who are new to online learning sometimes asked about the quiz mechanism and some technical obstacles. The online system through Moodle does not facilitate that issue, so the students still need to contact the lecturer personally through private messages. The help or assistance button function is required to facilitate real-time communication in solving such problems. Moreover, if there are technical problems such as being unable to log in or forgetting their password, students need quick help to access online lectures. Consequently, the lecturer needs to stand by to respond to the students' questions. Another option is to find an operator who is always ready to address the technical obstacles when using the online system.

- *Lecture Delivery Method*

During observations, online lecture material is given in the form of PowerPoint slides that include sounds and moving pointers. Future research needs to examine whether the slides are good enough to help students understand lecture material or if they need video recordings of lecturers explaining the material better. The advantage of using PowerPoint slides is that if there is a need to change and add content, the editing process is easier than editing the lecturer's video recordings. As a solution, PowerPoint slides can be added with avatars or moving human characters, as other countries do. Through the addition of avatars, students will concentrate more because there is eye contact with avatars; the emotions, empathy, expressions, and body language of the lecturer, which are important components of online lecture interactions, can be felt by students^{5,10}.

Just like the physical class, the online class requires validation to ascertain whether students understand the lessons delivered. Validation can be done through quizzes, midterm tests, and final tests. During the observation, it was found that some students gathered to work on a quiz together. Further, students can easily open books or surf the internet to get answers during a test. If these things happen, it will be difficult to validate the success of online learning to provide a better understanding of students.



Figure 3: Students gathering together during the tests

Online tests can be in the form of multiple choice, short answers, or even essays. The observation found that multiple choice is a more fitting approach for conceptual understanding. Questions with a short answer are best for increasing memory of certain terms, and essays are best for case studies. Especially in the Computer Simulation class, which has quantitative materials, the essay type of question is more fitting. As long as the online test takes place, the usability aspects that need to be determined are whether students can amend their answers or return to the previous question if time permits.

- *Intonation and Voice Volume during Online Lecture*

At the end of the observation, participants were asked to provide some feedback regarding the online lecture process. Some participants complained about the lecturer's voice being too low, considering they had turned the volume to the maximum level. Other feedback mentioned that the lecturer's intonation when delivering the lesson was too flat when the lecturer's face could not be seen. These factors caused some participants to express that they were more satisfied with a physical class because being able to see the lecturer's expression during the lessons helps them in understanding the materials. Furthermore, if the delivery of the materials is considered too fast to understand the first time, students can pause or control the speed of delivery.

Other Cognitive Aspects

During the observation, students were asked to join the online class at the same time in a room. Although in real conditions, online class occurs in in the students' own locations, having the students together enables researchers to observe their cognitive aspects and behaviour. Some students tried to write while listening to the online lecture, and some did not. This depends

on the student's study pattern and tendency, whether they are visual, auditory, or kinesthetic kinds of learners. For visual learners, interesting slides will help their motivation to study. The auditory learner would focus on the intonation and volume of the lecturer. The kinesthetic learner was rarely found but needs to be adaptive to the online learning process.

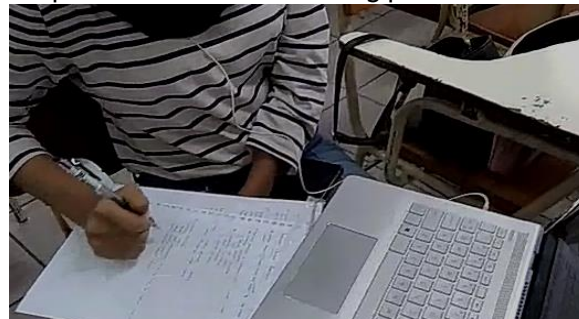


Figure 4: Students tried to write while listening to the online lecture

The other issue is the lecture system in Indonesia has six main activities in physical classes: face-to-face lectures, quizzes, midterms, final examinations, presentations and assignments. All of these activities can be facilitated by the online learning system. The question becomes how effective an online learning system can facilitate the ability of students to make presentations.

DISCUSSION

If further observed, research on online learning in Indonesia can be done through two perspectives, the students' side and the lecturers' side. This preliminary study is more focused on the perspective from student capabilities in online learning. This research can be continued by further discussion regarding the technology adaptation process of the lecturers to adjust to the online lecture tool, especially elderly lecturers who have conducted lectures in a physical class for years. The qualifications and capabilities¹¹ of the teaching staff must be considered by campuses in facing challenges in the future.

Another barrier in online lectures from the lecturer's point of view is feeling dissatisfied with the quality of students during the online learning process because lecturers cannot directly assess students' understanding. In addition, there is no evidence now that the online learning process can produce the same quality of students' understanding as the physical process. It raises the lecturer doubts so they do not do their best in preparing learning tools.

The online learning process also presents a big challenge for exact and quantitative subjects, especially in how students can interactively follow the lecturers' explanations of formulas,

derived formulas, mathematical calculations, and so on. Some lecturers on selected campuses in Indonesia thought courses related to theory are easier to explain through the online learning process. This should also receive further attention to improve the quality of online learning in Indonesia.

From the students' perspective, the online learning process requires initiative, personal awareness, integrity, and a high level of responsibility. To carry out online lectures, a cultural transformation is also needed so these learning tools can produce a real impact.

Further research according to those variables can be done through the design of experimental planning to deliver analysis that gives the best solution. The final result of this analysis will be an input in designing online lecture procedures that best fit for implementation with college students of Indonesia.

CONCLUSION

Human factors in implementing online lectures in selected Indonesian campuses need to be considered from three aspects, which are:

(1) Rules

- Presence mechanism
- Briefing before online lecture
- Online lecture schedule
- Device

(2) Usability aspects

- Language
- Help or assistance button
- Lecture delivery method
- Intonation and voice volume during online lecture

(3) Cognitive aspects, as students have differences in learning styles, such as visual, auditory and kinesthetic.

From this preliminary study, it was found that some environmental factors cannot be controlled, such as the quality of the place that the student decides to use for participating in online learning.

COMPETING INTERESTS

There is no conflict of interest.

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