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Lecturers' checklist instrument to monitor students' understanding in distance learning

Sari Muthia Silalahi[1], Dedy Anwar [2], Juli Yanti Damanik[2]
[1]Department of Diploma III Computer Engineering, Faculty of Vocational, Institut Teknologi Del, North Sumatera, Indonesia
[2]Bioprocess Engineering Study Program, Faculty of Biotechnology, Institut Teknologi Del, North Sumatera, Indonesia

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ABSTRACT

This paper aimed at exploring the results of participant self monitoring using a checklist instrument in distance learning with flipped classroom setting. The participants were 11 lecturers of Bioprocess Engineering Study Program at Institut Teknologi Del (IT Del), Indonesia. The objective of the checklist instrument was for the lecturers to monitor their students' understanding about the lessons given each week. The data generated from the instrument was analysed descriptively. The results found that pre-class, in-class and out-class are important parts of learning in flipped classroom setting. The data showed that 56% of students achieved good understading of the knowledge taught by their lecturers. The same idea as in-class, attendance checking and interaction between students and lecturers had a key factor in the learning process. It was found that students' understanding increased by 20% (very good), 62% (good) and 18% (moderate) through questions and answers, discussions, and tests at the end of class. Those were the modes of interactions that had been done in class. In line with an out-class checklist, giving assignments and feedback could improve students understanding into the level of very good (61%), good (27%) and sufficient (10%). with using a checklist tool, participants in this study self-monitored their progress in a flipped classroom while taking distance learning courses online to improve the quality of their class.

Corresponding Author:

Sari Muthia Silalahi
Department of Diploma III Computer Engineering, Faculty of Vocational, Institut Teknologi Del
North Sumatera, Indonesia
Email: sarimuthiasilalahi@gmail.com

1. INTRODUCTION

The emergence of the COVID-19 virus has encouraged the world of education to innovate learning implementation since face-to-face learning is no longer possible. In an emergency, changes are made by simply shifting face-to-face learning to online learning. However, further efforts are needed to avoid a decline in learning quality. Universities have made massive efforts since the outbreak of the crisis to overcome distractions and continue online learning [1]. Online learning and teaching gives students the opportunity to learn in different style and situation, but there are various issues that are attached with the new methodology of teaching [2]. The implementation of this change cannot be done only in terms of policy, but it needs to be assisted by guiding its people to overcome challenges. For an example, some of the challenges in implementing online learning such as content development are a lack of motivation and commitment [3]. It is necessary to help people involved in the transition from face-to-face learning to online learning.

At Institut Teknologi Del (IT Del), changes in the implementation of learning are carried out by applying flipped learning. The application of flipped learning is expected to overcome students' problem of

indiscipline conducting independent learning during distance learning. Flipped learning is the reverse of the traditional learning in which teaching is completed in the classroom and students learn more about lessons after class. Implementing flipped learning requires lecturer to prepare learning materials or learning videos ready beforehand for teaching in the class. Learning materials or videos are given to encourage students to learn before the class starts. Lecturer must become a fasilitator to students. With flipped learning, there is more space for active learning. The time used in the classroom becomes more effective as the lecturer's role is to help students solve questions that emerge when students do independent learning before class [4]. In flipped learning, students' attention is increased because the class needs active participants, which means that the learning participants do not merely sit and listen [5], [6]. Flipped learning improves students' understanding of concepts taught to them by their lecturers [7].

Flipped learning is a pedagogical method that can be implemented to facilitate learning by considering time efficiency and utilising technology in distance learning [8]. The implementation of flipped learning can help to facilitate active learning, increase teamwork, encourage autonomous learning, and gain interaction from teacher-to-student and student-to-student [9]. According to Annan *et al*. [10], the teaching outcomes of learning from Bloom's Taxonomy is turned upside down when flipped learning is implemented. In the first stage (pre-class), students learn to remember, understand, and apply which involves watching videos, visiting course-related website, working on assignments, or reading material at home. In the next stage (in-class), students can learn deeper and engage with the lecturer in high-order thinking skills activities such as analyzing, evaluating and creating.

In the implementation, guidelines are needed for lecturers to adapt. To help lecturers adapt to changes, an instrument in the checklist form has been developed as a reminder and guidance in preparing lectures referring to the flipped learning stages. Other research also discusses about guidance in implementing flipped learning components and principles in the form of framework [11]. The example stages of flipped learning were explained by Hwang [12] which were divided into three stages: i) Before class (lecturers upload a video containing concept or basic knowledge and students need to preview it); ii) In class (students and lecturers have a discussion and clarify the material given in before class); and iii) After class (students get a test to assess their learning status). In addition, it is expected that the lecturer will be able to produce continuous learning stages from the before-class, in-class, and after-class stages with the help of the checklist form. In line with Sinha and Rowe [13], an instrument in the form of a checklist was also developed to provide an overview of effective material delivery strategies to be applied in the preparation and delivery stages. Our instrument is also expected to facilitate supervision and assessment of the lecture implementation. Therefore, this article aims to show the components of checklist instrument and its implementation results.

2. RESEARCH METHOD

A quantitative descriptive study was chosen to explore the results of lecturers' self-monitoring by using the instrument provided. A qualitative descriptive study's objective is to describe an event and its nature, and istead of investigating how or why an event happens, this study focuses on revealing the what aspect [14]. Further, Nassaji [14] argues that this method has been widely applied in various fields of research, including in education. As an example, Rahman [15] write a study about the assessment of self-monitoring strategies used by lecturers to evaluate their performance (learning and teaching process) using qualitative descriptive method. Another study from Wahidin and Romli [16] completed their study on describing a number of aspects happening in the National Sciences and Mathematics Competition (ONMIPA) by utilising this method. As the purpose of this study is to describe participants' self-monitoring using a checklist instrument, the qualitative descriptive method was applied.

The data in this study was generated from a checklist instrument that had been filled by all 11 lecturers in Bioprocess Engineering Study Program, IT Del, Indonesia in the first semester of academic year 2020/2021. The data from bioprocess engineering study program was chosen as the sample because it was the study program in which all the lecturers completed the checklist instrument in the whole semester. There were 256 meetings in total. Pie figures illustrating the result were presented to be analysed descriptively in percentages.

2.1. Monitoring instrument

In this study, an instrument used by lecturers to monitor their teaching was introduced. It was designed by Electronic and STEM Learning Development Technical Service Unit (UPT PP ESTEM) IT Del to help lecturers monitor their learning with flipped classroom during the distance learning. The designed instrument has been presented in IT Del academic forums and has been revised under the supervision of the institute's academic senate and the vice rector for students and academic affair.

The instrument was designed by incorporating principles of flipped learning: pre class, in class, and out class. Lecturers filled the questionnaire by the end of each week in the semester. There were 16 weeks in total in the semester, included two weeks of mid-term test and final test.

The instrument consists of several elements such as: 1) The course identity (including the course's name and code, and the lecturers' names; ii) The week; iii) Checklist of lecturers' activities required in pre class, in class, and out class; iv) Checklist of lecturers' observation on their students (sampling) in pre class, in class, and out class.

The checklist of lecturers' activities required in pre class cover the following checks: i) Learning materials according to the course syllabus (learning videos and/other sources); ii) Learning materials according to the course outcomes; iii) Providing learning materials on time every week; iv) Link of the learning video provided; v) Whether the video was theirs or others'; vi) Informing the students about the learning objectives; and vii) Giving instructions to students to complete their independent study with provided materials. Lecturers' checklist in in-class are: i) Providing a media for discussion in synchronised meeting; ii) Checking students' attendance; iii) The percentage of students' attendance; iv) Cross-checking students' understanding of the learning material (sampling); iv) Methods of cross-checking (direct question and answer, discussion, completing tasks); vi) Giving instructions to deepen students' understanding by completing tasks or independent learning; vii) The methods/the instructions. Meanwhile, lecturers' checklist for out class include: i) Guiding students to complete their tasks; ii) The methods of guiding students; iii) Evaluating and following up students' learning outcome; and iv) The methods of evaluation.

The next part is about the checklist of lecturers' observation on their students. In pre class, lecturers checked whether students learned the provided materials before the class started, and they checked if students understood about main points of the materials given that could be demosntrated through students' notes or students' asking questions. In in class, lecturers checked if their students checked in their attendance in the platform available. Lecturers also observed if two-way interactions between the lecturers and students were present. Then, lecturers ensured that their students gained better understanding of the material given after the synchronous meeting.

Furthermore, in out class, lecturers filled the checklist whether they ensured that their students practiced and completed their independent study individually or in group. They also needed to check if students' reflection of their independent study and group study were present. Finally, lecturers checked if they evaluated the course learning outcomes, and whether they were acheieved or not.

3. RESULTS AND DISCUSSION

3.1. Pre class

Pre-class is one of the important activities before class was started. A pre-test, which is an activity for students to know how far they understand the course, is included in it. A pre-test is a test that is carried out before something starts by people in another job [17]. A pre-test is given to know the abilities of students regarding the material to be delivered or passed [18]. Thus, lecturers as facilitators can determine the model, method, and strategy for delivering lessons.

Figure 1 shows that from 256 meetings, there were 69% of different lecturers and courses gave pre-assignment to monitor students' understanding. However, there were still lecturers who might not have monitored their students before the class was conducted. Based on interviews with the lecturers who did the pre-assignment, it was found that the aim was to guide students to the appropriate understanding of the knowledge they have prepared to meet the test. The pre-assignment was provided in several types such as multiple-choice, essay, and interview, as well as a summary report (journal).

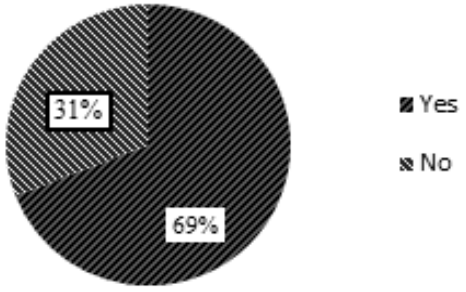

Figure 1. Checking student's perception before class was started

The lecturers mentioned that this pre-assignment needed time, but they agreed that early monitoring was very useful for guiding students to keep the fire on the subject. Early monitoring is an important part of learning for students [19]. According to Han and Klein, early monitoring prepares students to solve problems and tests during class or out of class [20]. A teacher knows how to develop methods and skills in teaching through the preliminary data. They have to know and evaluate that all students are already in the lesson's purpose. Furthermore, they can spend much time in to solve difficult or advance questions [21]. The results of student understanding are represented in Figure 2.

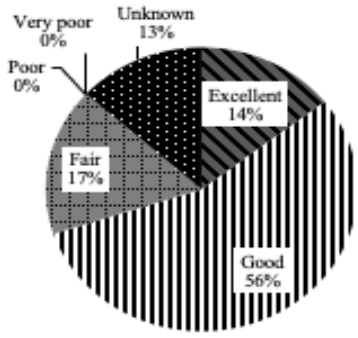

Figure 2. Student's perception of pre-class

Figure 2 shows students' perception about the course before class. It was found that when early monitoring was conducted, there were 56% of students who gained good understanding and 14% got excellent understanding. According to Lieu *et al*. [22], one of the benefits of early monitoring is that students can improve their knowledge and understanding. This is also supported by Jovanović *et al*. [23] who said that with pre-class teachers can predict the strength of their students before class was going on. What is more, teachers may provide feedback for students' understanding about which is true or wrong about their understanding during the class. Olakanmi [24] also said that it is good for teachers to prepare more challenging exercises or questions for students.

Early monitoring was running well among lecturers and students. Lecturers got the results to be achieved from the beginning and students' understanding of the concept is also achieved well [25]. This is also in line with one of the purposes of the pre-test that gives an overview for teachers to know students' insight from the last meeting [26]. It can be concluded that an early monitoring check is needed in a class

3.2. In class

Monitoring is understood as the process of systematically tracking aspects of student's performance [27]. Learning carried out directly by the teacher onsite or online is an activity that helps students deepen their understanding of concepts or theories. Students are able to convey the ideas from what they get during pre and in class.

Figure 3 describes the students' attendance data from out of 256 meetings conducted by different lecturers and courses. There were 215 meetings or around 84% that were checked for attendance by lecturers. The presence of students in learning is one of the important factors to support student understanding. The studies also show that attendance is one of the keys to student success [28]. It was supported by Louis *et al*. [29] that attendance and final grades have a strong relationship that affects children's education. In addition, attendance and performance have a significant correlation [30]. So, the lecturers had done a good evaluation, especially by checking student attendance which was almost 84% (215 times) from 256 meetings.

The interaction of students and teachers as well is one of the keys to the learning process. Students could express opinions and ideas from what they got before class started, so the lecturer could clarify the students' understanding. This interaction can be done in several ways, either directly or indirectly. Figure 4 shows that 68% of the lecturers had interactions with their students. Good interaction between students and teachers will lead to positive relationships and provide an effective learning environment [31]. Interactions between teachers and students will also give a sense of confidence for both [32]. On the other hand, 32% did not have interactions because the teaching was conducted in project learning, where the interaction of the learning process was not carried out intensely. In this study, the interaction was in virtual classroom using different platforms because it was still in pandemic situations/the distance learning. The participants used a number of platforms to ensure that learning and interactions occurred, such as Youtube, conference

calls/meetings (Zoom, Google Meet), campus learning management system (LMS), and WhatsApp group for faster interactions.

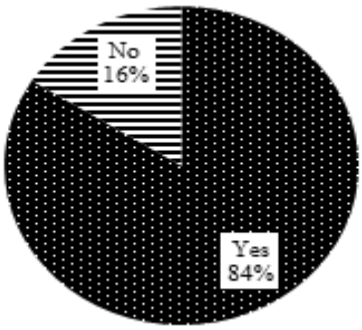

Figure 3. Attendance checking

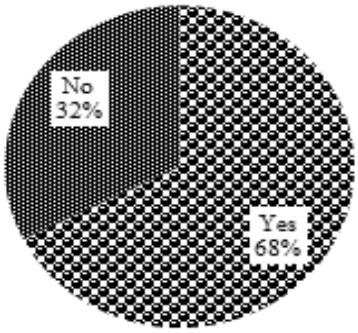

Figure 4. Interaction between students and lecturers

Based on the checklist, Zoom was the most frequently used platform for synchronous meetings. Zoom gives an opportunity between lecturers and students and for students to have direct communication through video conferences and other facilities [33]. The interaction was done with question and answer sessions, discussions and sharing. Zoom meetings also assist teachers in tracking and monitoring the student learning process.

This is also in line with Wei [34], who explains that the virtual classroom (lecturers-students interactions) can help the difficulties from previous lessons during the pre-class. In addition, interactions can give opportunities for students to build communication among them [35]. The study did demonstrate that the teaching method with the virtual class was effective as post-instructional knowledge increased by nearly half when compared with pretest levels [36]. This is also supported by the data on Figure 5 about student understanding which increased: 20% very good, 62% good and 18% moderate, when there was an effective interaction process performed in-class by question and answer, discussions, and tests at the end of class. Another research said that the accomplishment of active learning is done with direct interaction between the teacher and students in-class through problem-solving activities, so students can feel that they were part of a learning community [37].

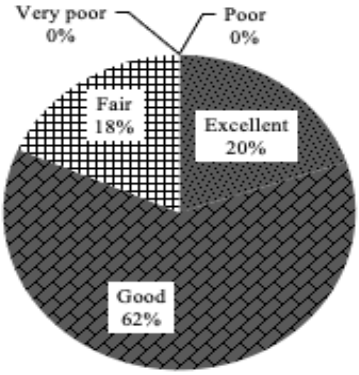

Figure 5. Students' understanding

3.3. Out class

There are a lot of ways to assess a student's concepts and knowledge, such as tests, quizzes, exams and projects. Students can study and prepare themselves to face the test [38]. Academic ability is a description of the level of knowledge or ability of students toward a subject matter that has been studied and can be used to acquire more complex knowledge which is commonly measured by assignments. Giving assessments when the class was over, it was one of the teacher's ways of evaluating their students to achieve

the grades [39]. The results of the assessment are used to evaluate students' learning and the effectiveness of the learning process. So, it can be said that the assessment is a process to find information that has been obtained by students [39].

Figure 6 describes that there were 77% of lecturers who provided assessments in the form of tests, exercises or independent learning after class while 23% who did not give them to their students. Assessment is designed so that students understand their progress towards course goals and modify their behavior in order to meet those goals [40]. Intensive continuous assessment is also needed in the learning process to improve students' understanding. The effects of assessment are: i) Self-regulated learning [41]; ii) Improved students' learning and scores [42]; iii) Improved understanding [43], [44]. This is also supported by data about students understanding from Figure 7 that illustrates very good results (61%), good (27%) and sufficient (10%). The lecturers also provided feedback when working on assignments, exercises and tests that allow students to evaluate independently and continue to develop their abilities at home.

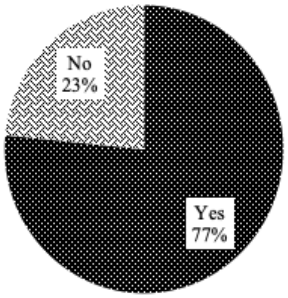

Figure 6. Giving assessment

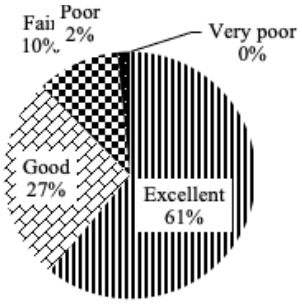

Figure 7. Students' understanding after assessment

4. CONCLUSION

Using a checklist tool, participants in this study self-monitored their progress in a flipped classroom while taking distance learning courses online. For the instrument's design, flipped learning ideas were incorporated: pre-class, during class, and beyond the classroom; In the study, it was revealed that pre-class preparation is an essential factor in students' ability to answer issues (questions, quizzes, or drills) both in and out of the class room. The statistics revealed that 56% of pupils had high knowledge and understanding, and 14% had a very good grasp of the material. Learning was aided by a combination of in-class attendance and interaction between lecturer and student. Students' comprehension improved by 20% (very good), 62% (good), and 18% (moderate) with questions and answers, discussions, and assessments at the conclusion of class. To ensure that the contacts happened, the aforementioned steps were done. According to the out-of-class checklist, students' knowledge may be improved by delivering tasks and feedback, resulting in outstanding (61%), good (27%) and fair (27%) outcomes (10%). However, it is still not feasible to get the complete picture from the facts supplied here. Participants' self-monitoring utilizing a checklist instrument in distance learning with flipped classroom settings should be examined using this method for more complete analysis of the data.

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BIOGRAPHIES OF AUTHORS

Sari Muthia Silalahi is a lecturer Mathematics at Diploma III Computer Engineering and the member of the UPT SAM (Science and Matahematics) and UPT PP ESTEM IT Del. She has researched focus on mathematics education and applied of mathematics. She has held Gugus Jaminan Mutu FITE (2019-2020), Gugus Kendali Mutu Prodi D3TK (2019- Now), Auditor (2018-Now), Member of UPT SAM (2018–Now), Member of UPT ESTEM (2020 –Now), W. Kemahasiswaan (Character Building) (2020-2021), Secretary of Team for Character Building (2020–2021), Korps Bebras Biro IT Del (2022). She can be concated at email: sari.silalahi@del.ac.id.

Dedy Anwar Anwar is a Process Design lecturer at Bioprocess Engineering (S1) Study Program, Faculty of Biotechnology, He is currently active developing learning method at Del institute of technology as as a Head of UPT PP ESTEM IT Del. His research interest is focused on bioenergy and biomassa utilization. He can be concated at email: dedy.anwar@del.ac.id.

Juli Yanti Damanik is an English lecturer at Bioprocess Engineering Study Program, Faculty of Biotechnology, and a member of UPT PP ESTEM IT Del. She is interested in teaching and learning in general, and in foreign teaching and learning in particular. She can be concated at email: juli.damanik@del.ac.id.