Assessment of Team Based Learning: The Use of Student Centred Learning for Interaction Design Class

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Abstract. Student-centred learning has been defined as small approach to improve learning objective through variety of process where students not only choose what to learn, but how and why. Moreover, the essence of the learning environment is the responsibility and activities of students, in contrast to the focus on coach control and the scope of academic content in the teaching with the traditional teaching. In this case, the use of Team based learning can take into account the aspects of the time of tasks termination and student activities to learn the subject content in the maximum way to enrich the other concepts outside the learning module. This study investigate the utilization of Team Based Learning in the subject of Interaction Design to improve the understanding from the student towards the curriculum objective and target.

1. Introduction
In general, every lectures in the class are conducted through face-to-face meetings and discussions where lecturers explain the material through power point slides which are equiped with a number of relevant videos and some good or bad examples of implementation has been applied in numerous teaching and learning process. Therefore, mostly students feel boring or find it difficult to this kind of approach, which lead to bad score or reluctant to have active participation in the class, especially in the Interaction Design Class that have been focused in this study. In the essence, presentations have included the theories that underlie the basic concepts of needs recognition, interaction processes and methods, interaction components that include humans, structures, tasks and technology, usability theory, the flow of life in the design process, methods of evaluating interface design and ubiquitous computing. To support the achievement of the TOEFL 550 for the international class and 500 for the regular class, the delivery of the material is done using 95% of English for international classes and with the use of slides that fully speak English for regular classes. Besides conveying the theories displayed on the slides, students were also invited to find out the linkages between theories presented with several examples of applications and products that are often used by people offline or online both from within and outside the country in the form of case studies based on lecturer experience. Meanwhile, class discussion activities are carried out during lecturer presentations. At the time of the explanation of the lecture material the lecturer involved students to participate in giving opinions or views on the theory delivered through a question and answer process or opinion expression to see how far their understanding of the material had been delivered also to ensure that the level of student participation became high.

The discussion is also directed to students' understanding by providing other similar examples, which are related and related to the topics discussed so that their level of understanding of a problem
becomes deeper. Of course, for students who are able to play an active role given the added value of individual activeness points that are included in the cumulative value of assignments each week. At the end of the discussion session the lecturer gives conclusions on the results of the discussion. However, this lecture turned out to provide less effective and efficient results that can be seen by the student's final grades based on the following table. Student performance results indicate that the students' level of understanding of interaction design material is still low, which is a new course based on the 2016 curriculum. These results are shown in the UTS and UAS values of interaction design for SI 39-INT class (50.3 and 51.14), classes SI-39-04 (52.9 and 52.8) and SI-39-06 (61.4 and 59.8) in even semester 2016-2017 with the average grades of UTS and UAS in the range of 50 to 62 from a scale of 100. The proportion of the value of this course is UTS 20 %, UAS 35%, weekly assignments 20% and big tasks 25% where students are required to design prototypes of an application based on usability principles. Meanwhile, the graduation rate is also worrying which are 18 students are not graduated from the entire class in the even semester of 2016-2017.

Table 1. Previous Grading in Interaction Design Class

| No | Class      | Number of Student | Number of Failed | Percentage per Class |
|----|------------|-------------------|------------------|----------------------|
| 1  | SI-39-01   | 34                | 0                | 0%                   |
| 2  | SI-39-02   | 42                | 3                | 7%                   |
| 3  | SI-39-03   | 43                | 6                | 13%                  |
| 4  | SI-39-04   | 49                | 0                | 0%                   |
| 5  | SI-39-05   | 43                | 2                | 4.7%                 |
| 6  | SI-39-06   | 26                | 1                | 3.8%                 |
| 7  | SI-39-07   | 40                | 1                | 2.5%                 |
| 8  | SI-39-08   | 43                | 5                | 11.6%                |
| 9  | SI-39-GAB  | 7                 | 0                | 0%                   |
| 10 | SI-39-INT  | 6                 | 0                | 0%                   |
|    |            | 333               | 18               | 5.4%                 |

In general, the purpose of this research is to increasing students' understanding of learning by using Team Based Learning in the Interaction Design courses, with focus on the process analysing an IT product. TBL has been chosen because the limitation of time, curriculum and facilities in the university to visit and meet the practitioner in the industry. On the other hand, Team Based Learning (TBL) helps teachers to develop an active classroom teaching approach through teamwork in the specific topic. TBL infrastructure involves students in the learning process through Readiness Study and Problem Solving processes through team discussions and peer feedback to ensure accountability. This paper explains the benefits and constraints of TBL and tools for developing, implementing and critically evaluating technology in courses in an easy-to-use way. In particular, this study using various manuscripts to describe processes that support the development, preparation, implementation, evaluation and effective evaluation of TBL, as well as practical techniques and advice from the experience of the class authors. This paper also highlights articles published in the TBL field in education, with an emphasis on application development for user experience and user centre design.
2. Theoretical Foundation

Team-based learning is an educational strategy designed to support the development of team learning and has a three-stage approach. In the first stage (preparation), learners acquire new information before class and are then charged for the information they learned in class with a brief assessment based on the material assigned to the previous review of the class called Readiness Assessment Process (RAP) - the second phase of TBL. The RAP assessment includes a brief assessment of individuals who understand content followed by team participation from the same evaluation. This sequence seeks to improve collaborative learning to ensure readiness of the student regiment to participate in the next phase of problem solving (application exercises). During the third phase (application), students share the information they receive while in teams to solve real world problems, apply the information they learned in the investigation, and ultimately, provide friend feedback. Throughout this strategy, trainers serve more as facilitators of content experts [1-4].

According to Michaelsen, the pioneer in this teaching strategy, TBL requires faculty members to do the following: make their reading and pre-class preparation clear to students; use a mechanism to test students’ individual understanding of content within the assigned readings; use a mechanism to test students’ performance within a team that is consistent with, or similar to, that used to ascertain individual understanding; engage students in discussion after the individual-based and team based assessments to identify areas where knowledge is strong and where it is weak. Team formation is an integral part of the TBL process. Ideally, the teams should consist of 5 to 7 students from diverse backgrounds to promote different perspectives. Diversification of team members can include differences in academic achievement, abilities and cultural background. To reduce the formation of homogenous teams may occur through the group’s self-selection, the coach must assign students strategically to the team. There are several ways to ensure heterogeneity, including asking students to answer yes / no questions about particular characteristics (eg. background, average values, races) or to collect relevant student information (learning patterns) before class, so once a team is formed, it must always be during the course or semester [5-8].

3. Research Methodology

In general, this study only focuses on Interaction Design courses which are based on the 2016 curriculum adopted at the Faculty of Industrial Engineering at Telkom University. This research also only focuses on theories and concepts that must be understood maximally, namely PACT and Usability Concept by students for application development purposes. UTS, UAS, Big Tasks and Weekly Tasks are not the object of research. The method applied uses team-based learning (TBL) by discussing case studies of IT products commonly used by students such as ATM machines, i-Gracias and e-commerce sites. Students are asked to analyse design problems and design issues using the PACT method and analysis of Usability concepts individually and in groups. Individual results without group discussion but after the lecturer explains the subject matter then compared with the individual results after the group discussion where students are asked to write other examples beyond the answers previously stated.

![Team Based Learning Process (Whitley, et. al, 2015)](image-url)
4. Analysis and Result

The observation process for each student is done directly, which consist several activities, which are fill out the observation sheet of the teaching and learning process and make notes in the lecturer notes if there are special things happening during the learning process while helping students work in their groups. Then, collecting the individual pretest data at the beginning of the subject, giving a learning achievement test (post-test) and questionnaire at the end of each PTK cycle. Lastly, explaining the inability to understand the material delivered until the middle of the semester. The form design that is widely known by the public. In the last week before UTS, lecturers will repeat the material in general convey through applicative and contextually about one example of interaction design. The form of questions from UTS is about the concept and understanding of the material that has been delivered. The midterm exam is conducted to determine the level of students’ ability to understand the material delivered during the middle of the semester. The form of questions from UTS is about the concept and understanding of the material that has been conveyed both through applicative and contextually about one example of interaction design that is widely known by the public. In the last week before UTS, lecturers will repeat the material in general to help students recall and understand the material and help them focus in preparation for facing UTS.

The results of peer assessment will also be given to individuals as a reflection material especially related to communication and interaction skills in the team. The midterm exam is conducted to determine the level of students’ ability to understand the material delivered until the middle of the semester. The form of questions from UTS is about the concept and understanding of the material that has been conveyed both through applicative and contextually about one example of interaction design that is widely known by the public. In the last week before UTS, lecturers will repeat the material in general to help students recall and understand the material and help them focus in preparation for facing UTS.

Table 2. Detail Score in Phase 1 (Left Side) and Phase 2 (Right Side)

| No. | Pre Test (I-RAT) (15%) | Post Test (G-RAT) (30%) | Case Study (40%) | Peer Assessment (15%) | Total Score (100%) | Pre Test (G-RAT) (15%) | Post Test (I-RAT) (30%) | Case Study (40%) | Peer Assessment (15%) | Total Score (100%) |
|-----|------------------------|------------------------|------------------|----------------------|-------------------|------------------------|------------------------|------------------|----------------------|-------------------|
| 1.  | 5                      | 60 (18%)               | 85 (34%)         | 84 (12.6%)           | 65.35             | 20 (3%)                | 35 (10.5%)            | 40 (16%)         | 70 (10.5%)           | 40                |
| 2.  | 15                     | 80 (24%)               | 95 (38%)         | 90 (13.5%)           | 83.75             | 20 (3%)                | 25 (7.5%)             | 90 (27%)         | 85 (34%)             | 82                |
| 3.  | 55                     | 80 (24%)               | 95 (38%)         | 90 (13.5%)           | 83.75             | 50 (7.5%)              | 90 (27%)             | 85 (34%)         | 90 (13.5%)           | 82                |
| 4.  | 5                      | 70 (21%)               | 55 (22%)         | 72 (10.8%)           | 54.55             | -- (0%)                | 50 (15%)              | 30 (12%)         | 60 (9%)              | 36                |
| 5.  | 35                     | 70 (21%)               | 75 (30%)         | 66 (9.9%)            | 63.15             | 20 (3%)                | 75 (22.5%)            | 85 (34%)         | 80 (12%)             | 71.5              |
| 6.  | 25                     | 70 (21%)               | 75 (30%)         | 66 (9.9%)            | 59.65             | 20 (3%)                | 35 (10.5%)            | 30 (12%)         | 60 (9%)              | 34.5              |
| 7.  | 5                      | 70 (21%)               | 40 (16%)         | 90 (13.5%)           | 46.75             | -- (0%)                | 35 (10.5%)            | 30 (12%)         | 40 (6%)              | 28.5              |
| 8.  | 45                     | 80 (24%)               | 90 (36%)         | 90 (13.5%)           | 80.25             | 50 (7.5%)              | 80 (24%)             | 70 (28%)         | 80 (12%)             | 71.5              |
| 9.  | 15                     | 70 (21%)               | 50 (20%)         | 60 (9%)              | 52.25             | -- (0%)                | 15 (4.5%)             | 25 (10%)         | 40 (6%)              | 20.5              |
| 10. | 5                      | 70 (21%)               | 60 (24%)         | 66 (9.9%)            | 55.65             | 10 (1.5%)              | 40 (12%)             | 70 (28%)         | 60 (9%)              | 50.5              |
| 11. | 35                     | 70 (21%)               | 75 (30%)         | 78 (11.7%)           | 67.95             | 10 (1.5%)              | 45 (13.5%)            | 55 (22%)         | 70 (10.5%)           | 47.5              |
| 12. | 15                     | 80 (24%)               | 85 (34%)         | 78 (11.7%)           | 71.95             | 10 (1.5%)              | 80 (24%)             | 85 (34%)         | 80 (12%)             | 71.5              |
| 13. | -- (0%)                | 80 (24%)               | 80 (32%)         | 90 (13.5%)           | 69.5              | 50 (7.5%)              | 90 (27%)             | 80 (32%)         | 90 (13.5%)           | 80                |
Lecturers expect students to also get used to asking questions about concepts that are not mastered in order to measure the extent to which the material that has been delivered is well understood by students. The exam consists of five parts, namely questions related to the term, relating to the concept, dealing with the approach or method of interaction design, explaining the reasons contextually and case studies from one of the system applications. Before UTS conducted a thorough review of the material that had been submitted and made a breakdown of the application that became a case study in UTS. By doing this process, students are expected to have better preparation and a deeper understanding of exam content. The concept of teaching in the interaction design course that uses the concept of student centered learning (SCL) is good. Discussion on each material delivery can help students think critically and explore further about the lecture material independently. Almost every chapter, students are given a case study as a form of theory enrichment that has been taught with an explanation of the implications that occur in the field. However, students lack concentration and focus on presenting material. This is due to many factors such as the full schedule of courses that must be taken by them as well as the many assignments that cause some students to just complete a simple assignment. There are also many students who are busier with the activities of the organization or the lab so that they forget their main function as students in the class. Some are also busier with off-campus activities so that the time spent in class is more used to rest or talk with friends beside them. For that reasons, it would be nice to have the counselling function at the structural level by giving motivation to the students in their routine day.

Observations are carried out individually considering the number of students in the International class is 13 people. Phase 2’s focus is to prepare students to solve problems at a more complex level. If the previous material students only focus on basic material with simple case studies, then at this stage students will solve complex problems in the project which involve several factors. If planning 1 is done before UTS, planning 2 is done after UTS. With a permanent team, lecturers prepare real cases in the company to be completed by the team. I-RAT 2 and G-RAT 2 are done to ensure students are ready to solve the complex problem. The material used in this case is a needs analysis consisting of identifying functions and non-functions of the two existing applications on the market, namely online transportation services on Gojek and grab and online reservations at Lion Air and Air Asia. The planning process is delayed because there is a special situation that occurs where there is a leak in the midterm exam (UTS) conducted by one of the lecturers. This is known after a student is proven cheating with a piece of paper, which is then known as a photocopy of all the questions given to class SI40-04. Therefore, the value obtained from the previous examination was finally cancelled, causing the PTK implementation schedule in the second cycle to be postponed next week. The re-examination was carried out using the oral test, instead of multiple choices which took a long time in the preparation.

There are several notes that need to be considered in the implementation of parallel classes involving several subjects, namely information system design analysis (APSI), business process engineering (RPB), interaction design (PI) and database system (Basdat). The purpose of parallel classes is to reduce the burden on students in designing and building applications based on similar topics. Although the goal is good, in principle there are some weaknesses, among others, the evaluation process conducted at the end of the semester makes several errors accumulate in the final project, where students work on models, specifications, prototypes and databases in one phase. In addition, there is no time for students to evaluate their designs so that the implementation process becomes very bad. A little time from when students receive lessons to a time when they have to complete their big assignments is too short so the end result is also not satisfying because many functions and features cannot be implemented only in the form of imagination and promises that are not realized.

There needs to be a more critical effort to make the process of giving concepts and theories go straight with the practical so that the results achieved are also very satisfying in accordance with the needs of the market or industry. This can be achieved by the presence of a coordinator that houses parallel classes so that the task allocation process and the criteria are more practical and focused instead of cross-classes where each subject coordinator is likely to have a different perspective on the weight and
burden of assignments given to students. The lack of clarity about the semester learning design because the busyness of each lecturer who can only be found during the course of learning makes some coordinator's policies not delivered properly because the discussions did not go smoothly. This caused the lecturer to interpret several decisions incorrectly, as happened with a threshold where there were lecturers who lowered the limit of 80 to A, to 77.5 in the SI-39-01 and SI-39-02 classes so that the number of students who got A became many reached 16 people.

Based on the results of the IRAT 2 and GRAT 2 assessment, students were asked to discuss matters that still need to be explained in class so that students can complete case studies according to existing criteria. The team can request feedback from the lecturer about the progress of their assignments so that they can improve if errors are found. Students take UAS without notes or notes. Then this value is compared between students in the intervention class and the control class. If there is no significant difference, it is necessary to evaluate the TBL method used. The final semester exam is conducted to determine the level of students' ability to understand the material presented in its entirety. The existence of this test is very important considering the theory and concepts in the design of interactions are the main things that need to be owned by a designer before carrying out the design process. By knowing the differences in the design method can help the decision making process that takes into account the strengths and the capabilities of the student. In this exam two parts of the question are given in the form of the contents of the blanks and case studies. In the case study students were asked to perform the function analysis process, design the needs and responsibilities of the system, identify problems and issues in the system, comparison of design techniques that can be used to solve problems, and evaluation techniques to test and ensure the suitability of features with the need for effectiveness and efficiency. In both the UTS and UAS, there are several bonus questions given within 2 hours of normal time to help students formulate and answer. Furthermore, some individual characteristics that can influence the learning process include learning styles, type of personality, intellectual ability, achievement motivation and academic success of psychology [10-13].

5. Conclusion

By comparing the total value of each student as well as the average score on the implementation of the pre-test, post-test and case study, it can be concluded that there was a decrease in the total value of each student where only two students experienced an increase, where the material tested was different from the first cycle which was related to PACT analysis while the second cycle was related to needs analysis. Meanwhile, there was also a decrease in the overall average score of students that could be understood from 63.7 to 50.5 with several reasons, namely the level of attendance at the first cycle was only one student who was not present at the pretest, while in the second cycle there were three students who were not present at the pretest. It can be assumed that makes a decline in value is related to the level of student motivation that is different between the first and second cycles due to many factors such as saturation, number of tasks and practicum.
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