Classroom action research using student team achievement division approach case study: business process modelling course on bpmn subtopics

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Abstract. Business Process Modeling is a subject that becomes the basis of student of information systems in designing business processes. The purpose of this course is to provide an overview of the analysis of business processes in a specific case study. The results for the odd semester of last year for the Business Process Modeling course showed the results that students' understanding was not satisfactory towards this subject with conventional learning methods. This study designs a learning method with Student Team-Achievement Division (STAD) approach that aims to improve students' understanding of Business Process Modeling Notation (BPMN), both basic and advanced modeling that support Final Assessment and to determine the effect of STAD method on the final grade of Final Assessment in this course. This research stage consists of two cycles. The first cycle activities consist of planning, class action, observation, and analysis and reflection. Activity in cycle two is based on reflection from cycle one divided into redesign, implementation and observation, and reflection. Based on the two cycles that have been done, the positive change is indicated by the increase in the grade of Post Test 2 on Post Test 1. In all study classes there was an increase of 13.12% in class A, 8.01% in class B and 4.82% at class B. This study confirmed that STAD learning method can increase the average grade of class test, increase student participation in learning process such as listening, discussing, asking and expressing opinion. In addition, STAD method is also able to increase the sense of responsibility, cooperation, socialization.

Keywords—STAD; cooperative learning; learning design; BPMN

1. Introduction

Business Process Modeling (BPM) is a structured approach to analyze and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company’s operation [1]. BPM is one of the compulsory subjects in the Information Systems. This course is important because it is also needed in an organization. BPM can understand the process flow in conducting a business process, identify problems and find weaknesses in existing business processes so that they can be managed properly [2]. Based on the analysis of business processes, and then obtained the business process flow which will be described by using modeling language Business Process Modeling Notation (BPMN). The selection of modeling according to BPMN is based on the advantages of BPMN in accommodating the presentation of business needs into a business process model that can be easily explained and transformed [3]. In this course students are taught how to
analyze business processes based on real conditions, and do the design of the analysis that has been done. This course becomes the basis of student knowledge of information systems in designing business processes. The results of the business process design will be useful for students when they will do the application flow design in the next semester for subject of Analysis and Design of Information System, Business Process Engineering, Web Application Development, and others.

This research designs learning method with Student Team-Achievement Division (STAD) approach. The number of classes that follow this learning process is three parallel classes. In each class will get the same treatment on learning using STAD method. STAD is a method that is widely used in various subject subjects or learning, such as math, language, and social sciences. This method has also been used from grade 2 of elementary school to college. STAD is the most appropriate method for courses with clearly defined objectives [4]. This is in line with the characteristics of business process modeling courses, where the learning outcomes are clearly defined in the form of business processes and design concepts. Based on a study of more than 4000 students and using 11 comparisons meeting the Best Evidence Encyclopedia (BEE) inclusion criteria, nine of them used a random assignment to a condition, sample-size-weighted effect of size $+0.14$ [5]. The exposure of these results indicates that STAD method is one of the right solutions to improve learning in business process modeling courses.

2. Literature Review

Cooperative learning is the best way to improve achievement, when team / group students have a common goal that can only be achieved if all group members start learning, so they focus on teaching and learning each other instead of solving group tasks [6]. There is a capable model flow of describing functional relationships between several theoretical approaches to cooperative learning, as shown in Figure 1.

![Figure 1](Integration of the theoretical perspectives of cooperative learning effects on learning [2].)

Student Teams Achievement Division (STAD) is one of the methods or approaches in simple and good cooperative learning for lecturers who just started using cooperative approach in the classroom. STAD is a simple form of Teams Game Tournament (TGT) method [6]. STAD replaces Game usage on TGT with quiz. This method is a method that focuses on teamwork, and does not consider individual competition as in TGT. The main purpose of STAD is to motivate learners to be able to support each other and help each other in mastering the ability taught by the lecturer.

2.1. Definition of STAD Cooperative Learning

Student Teams-Achievement Divisions (STAD) was a method designed by Slavin in 1980. Some of the things used in STAD include class presentations, team practices, worksheets and newsletter classes. Almost the same as the TGT, only on STAD game activity tournaments replaced with quiz and bonus points system as a reward for students who have increased grade on the quiz. There are 5 components in the STAD between them [4].
2.1.1. Class Presentation
The material to be mastered was initially presented in class by lecturer or by audiovisual presentation.

2.1.2. Team
Each team consists of 4 or 5 carefully selected students who can demonstrate diversity. The team should be heterogeneous as much as possible both of the gender, ethnicity, and level of student abilities. Team members work together in peer-tutoring format to master learning materials. Each member of the team as often as possible testing each other, learning from worksheets in which there are problems to be resolved and / or information to be mastered.

2.1.3. Quiz
Students are evaluated through individual quizzes. Quizzes assess individual achievements in the material presented in the classroom and put into practice in teams.

2.1.4. Improvement Grade
A detailed scoring system allows students to earn points in their teams based on an increase in the average grade that is currently running at a grade in the past. The scoring system is based on periodically adjusted "baseline grades" for each student. Each student or team earns points based on performance improvements in the past.

2.1.5. Team Recognition / Appreciation
Lecturers can use bulletins, bulletin boards or other forms of acknowledgment and social appreciation in giving team recognition. Awards are given to teams that achieve weekly performance for the highest individual enhancement and / or the highest cumulative individual rankings. Recognition is given to individuals who demonstrate the best or highest ability.

2.2. Advantages and Disadvantages of STAD Cooperative Learning
Student Teams Achievement Division (STAD), which is part of cooperative learning, has advantages such as: 1) able to motivate students to learn, (2) increase student self-confidence while studying, as a result of peer support, and (3) improving student achievement.

The disadvantages of the STAD method are: (1) if the lecturer fails to remind the students to always use the cooperative skills in the group, the group dynamics will appear to be stuck, (2) if the number of groups is not considered, ie less than four, then a member will tend to withdraw and be less active during the discussion and if the group is more than five then there is likely to be no assignment so that only piggyback in the completion of the task, and (3) if the group leader can not solve constructively constructed conflicts, then the group work will be less effective.

3. Learning Design
Classroom Action Research (CAR) or classroom action research is intended to improve students' learning motivation and student learning outcomes related to the learning process in the classroom. This study emphasizes how to act correctly and appropriately in the situation before him, in this case the learning process in the classroom. This research stage consists of several activities that have been adapted from the spiral model [7].

3.1. Design Phase Cycle 1

3.1.1. Planning
- Preparation of Syllabus in accordance with STAD method.
- Making learning media in the form of group discussion materials.
3.1.2. Action

This section is adapted to the STAD method and performed in 3 stages, namely the introduction, core, and closing.

3.1.2.1 Introduction

Submission of goals and motivation. Contains learning objectives to be achieved on learning and student motivation to learn.

Division of groups. Students are divided into groups, each group of 4 - 5 students prioritizing class heterogeneity in academic, gender / gender, race or ethnic achievement. The division of the group in the course of business process modeling is done based on the academic achievement history through the quiz results 1. The group making, done the first sorting based on the quiz and grouping into several divisions. Formation of divisions according to the number of groups to be created. (Table 1)

| No | Name   | Grade | Division | Group |
|----|--------|-------|----------|-------|
| 1  | Student 1 | 91    | 1        | Apple |
| 2  | Student 2 | 86    | 1        | Orange|
| 3  | Student 3 | 78    | 1        | Mango |
| 4  | Student 4 | 77    | 1        | Pineapple|
| 5  | Student 5 | 75    | 2        | Apple |
| 6  | Student 6 | 75    | 2        | Orange|
| 7  | Student 7 | 73    | 2        | Mango |
| 8  | Student 8 | 73    | 2        | Pineapple|
|    | etc     |       |          |       |

3.1.2.2 Core activities

Presentation from lecturers. Lecturers deliver lecture materials by explaining the purpose of the subject first. Lecturers also motivate students to learn actively and creatively in business process modeling courses.

Team work. Students study in groups that have been formed. Lecturers present worksheets as guidelines for group work, so that all members master and contribute respectively. At this stage the lecturers make observations, provide guidance, encouragement and assistance when needed.

3.1.2.3 Closing

Lecturer Quiz evaluates learning outcomes through quizzes and assesses the work of each group. Quizzes are held individually and group members are not allowed to help each other.

3.1.3 Observation

This section describes what is observed / recorded during PTK actions and what instruments or instruments are used. After the quiz, the lecturer checks the students' work and provides an assessment with a range of 0-100. In addition, the observations made during the learning process aims to find out:

- Teaching and learning situations that occur in the classroom.
- Activity of students in the learning process
- Student attitudes during discussion, questioning, and so forth.
- Students' ability to answer questions from lecturers.
3.1.4. Analysis and Reflection
This activity aims to improve the implementation of research in the next cycle. At this stage the lecturer performs a reflection and analysis that refers to the findings at the time of action. Based on the observations made, then bulletin board is announced to the class. The bulletin is a power point slide containing the top five student names that have the most significant improvement and the best team.

3.2. Design Phase Cycle 2
The design stage in cycle two is almost the same as the previous cycle such as re-planning, implementation, and observation.

4. Analysis of Learning Outcome

4.1. Analysis of Cycle 1
This research applied to three parallel classes that are class A, class B, and class C with subject course Business Process Modeling on BPMN material. The research phase in cycle 1 starts from the planning, implementation and observation stage, and the last phase of reflection. The planning and implementation phases are carried out in accordance with the research method. The reflection activity is done based on pre test 1 and post test 1.

At the observation stage, an analysis is conducted to find out the teaching learning situation that occurs in the classroom, the activity of the students in the learning process, the student attitude during the discussion, question and answer, and the students' ability when answering the questions from the lecturer. Each class has a similar response at the beginning of this method. Using visual observation, students can follow this method with enthusiasm. This can be shown in the value of post test 1 and in the research cycle 2.

![Figure 2. Result of cycle 1 improvement.](image)

Observations on test values showed significant progress between pretest 1 and post test 1 for class B and C (Fig 2). Different patterns were shown by class A. In class A there was a decrease of 12.3%, while in grade B there was an increase of 9.22% and 9.65% in class C. The average grade decrease in class A occurs because some students do not follow Post Test 1 which results in a value of 0 and affects the average grade.

![Figure 3. Student participation.](image)

4.2. Analysis of Cycle 2
In cycle 2 of re-planning, observation and reflection of actions are mostly like cycle 1. Re-planning is based on the shortcomings and constraints on cycle 1 as preparation before learning. Observation analysis was done through pre test 2 and post test 2.

In this second cycle, based on observation in the classroom and supported by the value of the discussion data can be concluded there is an increase in student participation in class B and C (Fig 3). In the class there is an increase in the average value of group discussion. In grade B there was an increase of 12.84%, the highest compared to the other classes. Class C is an increase of 5.84%.
Different changes were actually shown in class A which had the highest average discussion and participation rate. There was an average decrease of 1.72%. For Participation in class, actually class A is not much different like cycle one. Changes occur because researchers are re-planning in assessment methods. Broadly speaking the level of student participation in following the learning is much better than before.

![IMPROVEMENT OF CYCLE](image)

**Figure 4.** Result of cycle 2 improvement.

There is an increase in the value of pretest 2 and Post Test 2 (Fig 4). This increase is in line with improvements made based on reflection on cycle 2. In class A there was an increase of 0.94% while in class B and C sequentially is 4.55% and 8.54%.

4.3. **Overall analysis**

Positive changes were indicated by an increase in post test 2 on Post Test 1. In all study classes there was an increase of 13.12% in class A, 8.01% in class B and 4.82% in class C. Not many obstacles encountered in this 2nd cycle, except for the absence of some students which may affect the performance of the team left behind.

5. **Conclusion**

Based on the observation of cycle one and cycle two it can be seen that STAD learning method can increase the average value of class test, the value of final assessment business process analysis, increase student participation in learning process like listening, discussing, asking and expressing opinion. In addition STAD method is also able to increase the sense of responsibility, cooperation, and participation.

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