

COOPERATIVE LEARNING USING TEAM GAME TOURNAMENT METHOD TO IMPROVE STUDENT'S LEARNING PARTICIPATION AND COMPREHENSION

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ABSTRACT

This study aims to know the best practice cooperative learning method, that suitable for economics and business mathematics course learning in Muhammadiyah Malang University. The specific goals of this study are: (1) Improving students of class 1-D in Management Department of Muhammadiyah Malang University's learning participation in sequence and series subject matter using cooperative learning with Teams Games Tournament (TGT) method in the odd semester of 2017/2018, and also (2) Improving students of class D in Management Department of Muhammadiyah Malang University's comprehension about sequence and series subject matter using cooperative learning with Teams Games Tournament (TGT) method in the odd semester of 2017/2018. The results of this study show that learning activities using Teams Games Tournament (TGT) method has been proven can improve student's learning participation and comprehension in sequence and series subject matter of economics and business mathematics course.

Keywords: Cooperative learning, Team Games Tournament, Economics and Business Mathematics

INTRODUCTION

Nowadays mathematics learning activities are no longer only accentuating the absorption of information, but also more focus on capability development and information processing. Therefore the activities of learners should be improved by doing some mathematics exercises or tasks in small groups or by explaining and sharing their idea to others (Hartoyo, 2000). In college, Mathematics has more complex

method which can encourage the student's participation actively is cooperative learning. Cooperative learning is a learning method that involving students to works in groups to set common goals (Felder, 1994).

Cooperative learning emphasizes interactions among students. That interaction will lead the students to have active communication with their friends. Through that communication, students are expected to be able to master the subject matter easily because "students

between one and another concept, the students can be difficult to understand those mathematics concepts (Sutiarso, 2010).

Those steps require the student's active participation. For that reason, lectures need a learning method that directly involves the students in the learning process. One of the learning

method which can encourage the student's participation actively is cooperative learning. Cooperative learning is a learning method that involving students to works in groups to set common goals (Felder, 1994). Cooperative learning emphasizes interactions among students. That interaction will lead the students to have active communication with their friends. Through that communication, students are expected to be able to master the subject matter easily because "students explanation explanation from their teacher because their level of knowledge and thoughts are same and commensurate" (Sulaiman in Wahyuni 2001). There is previous research that also improves that cooperative learning has a positive impact on students who have low learning outcomes (Nur, 1996). Pete Tschumi from the University of Arkansas Little Rock introduced a

computer science introductory study three times, the first being students working individually and twice in groups. In the first class only 36% of students scored C or better, and in classes that worked cooperatively, there were 58% and 65% of students who got a C or better (Felder, 1994).

Cooperative learning in mathematics for economics and business course is essential to encourage the student participation in the learning process. The students of Management Department, Class 1-D, Faculty of Business and Economics, of Muhammadiyah University having difficulty to understand the sequence and series subject. Pre-test results show that on the application of sequence and series subject the average of their grade is still low, at 61.04. Besides, their participation both in groups or individuals is still lack, so cooperative learning methods are needed in class 1-D from the previous in-depth observations obtained that students of class 1-D were enthusiast about economics and business mathematics learning that combined with games. So that researchers will apply cooperative learning with the TGT (Team Games Tournament) method to increase the participation and learning achievement. Veloo, et al. (2016) explained that TGT cooperative learning involves the collaboration of students in small groups, where students are encouraged to help each other to achieve goals.

Based on the explanation above researchers want to try applying cooperative learning with TGT (Team Games Tournament) method as an alternative to improve student's learning achievement in mathematics subject by conducting study by title "Cooperative Learning with Team Games Tournament (TGT) Method to Improve Student's Learning Participation and Comprehension of Sequence and Series in Economics and Business Mathematics Subjects (Classroom Action Research in Management Department Students of Class 1-

D,Economics Faculty , University of Muhammadiyah Malang, Odd Semester 2017/2018) ".

Based on the research background above, so this research problems can be formulated as follows: 1) How was the initial conditions of the students of Management 1-D Class, Faculty of Economics and Business, University of Muhammadiyah Malang's learning participation and comprehension in application of sequence and series subject, mathematics for economics, odd semester 2017/2018?. 2) How is the application of cooperative learning with the Team Games Tournament method in improving the students of Management 1-D Class, Faculty of Economics and Business, University of Muhammadiyah Malang's learning participation and comprehension in the application of sequence and series subject, mathematics for economics, odd semester 2017/2018?. 3) Is the application of cooperative learning with the Team Games Tournament method able to increase the students of Management 1-D Class, Faculty of Economics and Business, University of Muhammadiyah Malang's learning participation and comprehension in the application of sequence and series subject, mathematics for economics, odd semester 2017/2018?.

With the research background and problems, this study has two objectives. First, improving the students of Management 1-D Class, Faculty of Economics and Business, University of Muhammadiyah Malang's learning participation in mathematics for economics, in sequence and series subject, odd semester 2017/2018. Second, improving the students of Management 1-D Class, Faculty of Economics and Business, University of Muhammadiyah Malang's comprehension and participation in mathematics for economics, in sequence and series subject, odd semester 2017/2018.

LITERATURE REVIEW

Cooperative learning is a learning strategy that there are some students with different levels of ability who make small groups, and must be working together and helping each other to understand the subject matter or completing their group assignments (Isjoni, 2010). According to Slavin (2008), cooperative learning is a learning model whose activities are more student-centered, and they are divided into groups of 4-6 people who have various abilities. Wahyuni (2001) states that cooperative learning is a learning strategy by placing students in small groups with different abilities.

Cooperative learning is a learning method by grouping students into small groups so that they can work together to solve problems. Students' abilities in each group are heterogeneous. In cooperative learning, students are not only as the learning objects but also as the subject in the learning process because they can be as creative as they can. Cooperative learning is one alternative method for approaching problems, able to doing big tasks, improving communication and social skills, and gaining self-confidence.

Richard (2008) explained that learning with cooperative methods can be characterized by these following characteristics: 1) Students work in groups to achieve the common goals, 2) That groups consist of students who have low, moderate, and high achievement, 3) The groups may consist of students from different race, culture and gender; 4) Reward system based on group and individual oriented.

In this learning method, students are encouraging each other to learn, strengthen each other's academic efforts and applying norms that can support to achieve high learning outcomes (Nur, 1996). Cooperative learning emphasizes social attitudes to achieve learning goals through cooperation. Johnson and Smitt in Felder (1994) added elements in cooperative learning as follows: 1. Positive Dependency, 2. Individual

Ability, 3. Interactive face-to-face Promotion, 4. Benefits of combining appropriate expertise, and 5. Process Group.

Based on the elements in cooperative learning, Johnson in Wahyuni (2001) explained the role of lecture in cooperative learning as follows: 1) Determining learning objects, 2) Making decisions to place students in study groups before the learning activity begins. 3) Explaining tasks and final goals to the students. 4) Mastering the study groups and providing assignments. 5) Evaluating student achievement and helping students by discussing the ways of cooperation.

The Teams Games Tournament (TGT) is learning that related to STAD (Student-Teams-Achievement-Division). This learning method students learn in small groups consists of 4-5 people who have different abilities and backgrounds to achieve the learning outcome. In Teams, Games Tournament (TGT) students play games with the other team's members to get points for their own team's scores. The game composed of some statements that relate to the subject matter. That statement was designed to know how much student's comprehension or knowledge they get after the learning process. The game played on the tournament tables. Each tournament table filled by representatives each group that has an equal capability. Learning using TGT (Team Games Tournament) method emphasizes the performance of group members so that the cooperation and participation of every individual are needed (Taniredja, T.dkk, 2011).

TGT is an academic tournament using quizzes and individual progress score systems, where students will be competing as their team representatives against the others that have the same academic outcome (Slavin, 2015). According to Shoimin (2014), TGT is a cooperative learning method that easy to apply, because its activities involve of all students with no difference in status,

involving students as peer tutors, and contain elements of playing and reinforcement.

Rusman (2014) defines TGT as one type of cooperative learning that places students in study groups consisting of 5 to 6 students who have different abilities, gender and ethnicity or race. Based on some opinions above, it can be inferred that the Teams Games Tournament (TGT) is a cooperative learning model that contains academic tournaments involving the activities of all students who have different abilities, gender and ethnicity or race.

The main idea behind the TGT method is to motivate and encourage the students to help each other to mastering skills that required by the lecturer. If students want their group to get an award, they must help their group members to learn the given material. They should encourage their friends to do the best that they can do and declare a norm that learning is important, valuable and enjoyable.

Participation is an activity that involves students in solving learning problems actively. Participation also activity that involves the students in learning situations that can develop their comprehension. Participation can change the implementation for the better by providing experience to encourage active students in the learning process. Rusman (2013) states that participatory learning is learning that optimally involves students in learning activities. Participatory learning involves students more in learning rather than teacher-centered.

Nurhayati (2016) argues that participation has several elements, as follows: a) Involvement of students in all activities in the teaching and learning process. b) The willingness of students to respond and be creative in the teaching and learning process. Participation has some benefit for student students to be better a person as stated by Keith Davis in Suryosubroto, (2002) as follows: 1) More likely to get the right decision. 2) Can be used

creative thinking skills of its members. 3) Can control the values of human dignity, motivation and build common interests. 4) Encourage people to be responsible. 5) More possible to follow changes.

Students' mathematical concepts comprehension must be following the level of mental development. Students whose not already reached the level of formal thinking will find it difficult to understand mathematical concepts. The difficulties in higher education are usually caused by the student's weakness in mastering mathematical concepts. The concept of mathematics in higher education is more complicated that consist of many symbols and meanings, and also because it is relevance to the previous concept. Students must be able to understand the meaning of symbols on the concept, master the previous concepts, and relate the previous concepts (Sutiarso, 2010). The ability to understand mathematical concepts is vital because in mathematics between one concept and another concept has a close relationship (Sari, 2018).

RESEARCH METHOD

Research design

This study designed as classroom action research (classroom action research), because this study was conducted to solve the problem of the learning process in the classroom. This study also descriptive research, because it describes how a learning technique is applied and how the desired results can be achieved. Oja and Sumarjan (in Titik Sugiarti, 1997) grouping action research into four types, as follow: (a) the teacher as a researcher; (b) collaborative action research; (c) simultaneous integration; (d) experimental social administration.

This study is using "lecturer as a researcher" technique. So lecturer is entirely in charge in this study. The primary purpose of this action research is to improve the learning outcomes where the lecturer is fully involved at

the beginning, from planning, action, observation, and reflection. In this study researchers did not cooperate with anyone, the presence of researchers in the classroom as lecturers should be carried out, as usual, so the students did not know if they are examined. So that, researcher be able to gain data as objective as possible for the validity needed.

Classroom Action Research Design

This study using action research methods with classroom action research technique (PTK). The implementation

adopts the PTK model from Kemmis and Taggart (in Sugiarti, 1997) that has a spiral form from one cycle to the next cycle. Each cycle includes planning, action, observation, and reflection. The next cycle is reviewing the plan, actions, observations, and reflections. Before the first cycle, preliminary actions were taken in the form of identifying problems. The spiral cycle of the classroom action research stages can be seen in Figure 1.1.

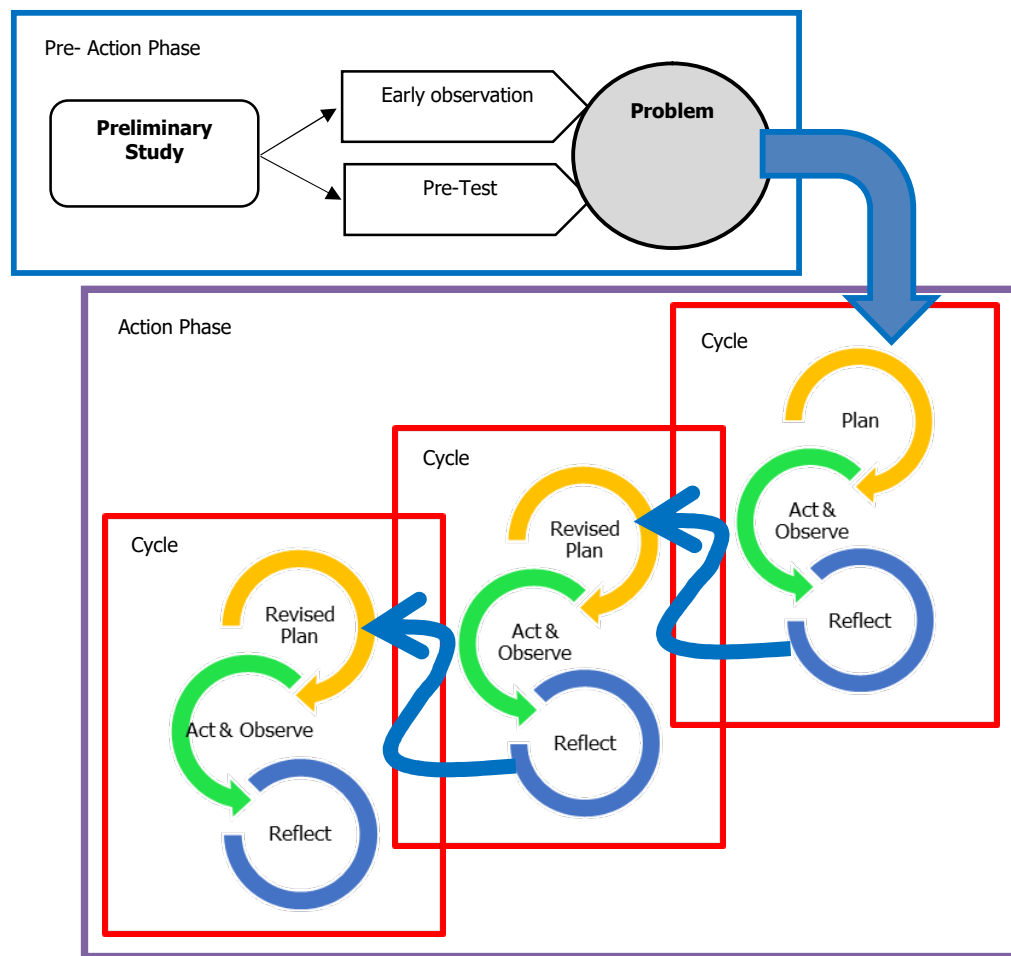


Figure 1.1 PTK Cycle Model Kemmis and Mc. Taggart with Minor Modified according to Research’s Need

Action Setting

- a. Class Settings / Target Action Subject
 The subject of action target in this study is students of Management

Class 1-D, Faculty of Economics and Business, Muhammadiyah Malang University, Odd Semester 2017/2018 Academic Year.

- b. **Course Settings and Action Target Material**
The subject that being a target for improvement this study is economics and business mathematics course, and the subject matter is the application of sequence and series.
- c. **Intervening Variable Settings**
The intervening variable can be interpreted as a "Formula" or "Drug" that applied as a treatment to overcome the problem of learning/ lecturing mathematics for economics subject, with the subject matter is the application of sequence and series, by cooperative learning with the Team Games Tournament (TGT) method.
- d. **Setting Target Action Variables**
The target of the action can be said as the "disease" or "problem" that should be improved, in this case, the target variable of action as a result of the preliminary study is students' learning participation, and comprehension in learning economics and business mathematics course, with subject matter is the application of lines and series.
- e. **Setting Place and Time of Action**
The implementation of the action took place in Room 2.13 of Gedung Kuliah Bersama II (GKB II), Muhammadiyah Malang University, its address at Jalan Raya Tlogomas No. 246, Malang, East Java.

Data Collection Technique

1. **Cognitive test**
Cognitive tests in this study were used to measure the level of the students' comprehension after taking economics-mathematics, which the subject matter is sequence and series through cooperative learning by Team Games Tournament (TGT) method. The test technique used in this

assessment is a direct written test (carried out in class), both individually and in groups. The written test used is a short form.

Observation in this study has two goals:

- a. Monitoring the learning activities carried out by the teacher to ensure the compatibility of cooperative learning with Team Games Tournament (TGT) method implementation with the syllabus and Rencana Program Pembelajaran (RPP), as well as to gain information that can be used in reflection and revision the action plans in next cycles.
- b. Providing assessment process that focused on the level of student participation during the learning process of economics and business mathematics course, which the subject matter is sequence and series throughout the cycles. Through this observation technique, we will get the dynamics participation of target action class in each cycle, so that the success rate of intervening variables in increasing student learning participation will be known.

Research Instruments

The instruments used in this research are:

1. **Syllabus for economics and business mathematics course**
A syllabus is a set of plans and arrangements regarding the learning activities in class, and also as a guide in assessing the learning outcomes for economics and business mathematics course. In this syllabus, the standard competency of the subject matter, application sequence, and series is known with its indicator that will be a guideline to formulate Rencana Program Pembelajaran (RPP) and

- this research action success indicators (**syllabus attached**)
2. Rencana Pelaksanaan Pembelajaran (RPP)
RPP Is a specific learning tool used as a guideline for the lecturer in learning/ lecturing activities. In this research RPP was prepared for three cycle that contain basic competencies, learning outcome indicators, specific learning objectives, learning methods, learning media, learning resources, description of learning activities, and learning evaluation (**RPP attached**)
 3. Kognitive Test Sheet
Cognitive test sheets were given through written assignments (individual) and direct tests (individual and group) in class. Cognitive tests were arranged based on the learning objectives. Its used to measure the student's comprehension about mathematics for economics concepts, with the subject matter the application of sequence and series. This test is given at the end of each round in the form of a brief description (objective) (**cognitive test sheet attached**).
 4. Observation Sheets for Learning and Teaching Activities
 - a. The observation sheets of cooperative learning by *Team Games Tournament* (TGT) method, is used to observe the compatibility of learning activities in the class by the lecturers (**observation sheets for learning and teaching activities attached**)
 - b. The student's activity observation sheets are used to know the level of student's participation during the action that given by lecturer, and then it will be compared with the syllabus, to find out the level of improvement following the action success indicators.

Data analysis technique

Analysis of Student's Learning Participation Level (Process Assessment Through Observation)

The analysis of student learning participation level in this study is carried out through observation techniques by using observation sheets as the instruments. Through the observation sheet, the analysis focuses on the process assessment during the action takes place.

Continuous observation (by the help of observers) has done to observe student's learning participation both individually and in groups. Learning participation is observed based on eight indicators that show the active involvement of students in the form of; (1) Asking Questions, (2) Answering Questions, (3) Completing Tasks, (4) Participation Workingin Group, (5) Recording the explanation by lecturer, (6) Solving problem on Whiteboard / Quiz, (7) Working on Individual Tests, and (8) Inferring.

The data analysis conducted by using the data that was taken from the observation sheets. Every item on the observation sheets was rated in a 1-4 scale range, then converted in alphabetical form before being given a predicate. Each cycle, student's learning participation individually continues to be monitored, then recapitalized as group participation, and at the end of each cycle, it will be converted as classical participation. Classical participation in every cycle was compared to determine the success of actions in term of improving student's learning participation.

In detail, the rubric of assessment process through observation with the observation sheets as the instrument to analyze the data to determine the level of student's learning participation will be represented in Table 1.

Table 1. Student's Learning Participation Assessment Rubric

Cycle	Indicators	Score Range
Cycle 1	1 Asking Questions	1 - 4
	2 Answering Questions	1 - 4
	3 Completing Tasks	1 - 4
	4 Participation Working in Group	1 - 4
	5 Recording the Explanation by Lecturer	1 - 4
	6 Solving problem on Whiteboard / Quiz	1 - 4
	7 Working on Individual Tests	1 - 4
	8 Inferring	1 - 4

Formula for Individual Participation Assessment, Cycle 1:

PI Cycle1 = (Score I1+ Score I2+ Score I3+ Score I4+ Score I5+ Score I6+ Score I7+ Score I8)/8

Cycle	Indicator	Score Range
Cycle 2	Indicator 1 - 8 same as cycle 1	Score Range = Cycle 1

Formula for Individual Participation Assessment, Cycle 2:

PI Cycle 2 = (Score I1+ Score I2+ Score I3+ Score I4+ Score I5+ Score I6+ Score I7+ Score I8)/8

Cycle	Indicator	Score Range
Cycle 3	Indicator 1- 8 same as cycle 1 and 2	Score Range = Cycle 1 & 2

Formula for Individual Participation Assessment, Cycle 2:

PI Cycle 2 = (Score I1+ Score I2+ Score I3+ Score I4+ Score I5+ Score I6+ Score I7+ Score I8)/8

Annotation :

PI	= Individual Learning Participation	I5	= Learning Participation Indicator 5
I1	= Learning Participation Indicator 1	I6	= Learning Participation Indicator 6
I2	= Learning Participation Indicator 2	I7	= Learning Participation Indicator 7
I3	= Learning Participation Indicator 3	I8	= Learning Participation Indicator 8
I4	= Learning Participation Indicator 4		

The formula for Groups Participation Assessment:

P.Group 1 Cycle 1 = (PI 1-1 + PI 1-2 + PI-n.....)/n

Annotation :

P.Group 1	Group's 1 Learning Participation, (Group 2 and so on. Using code PK 2, PK 3, and so on, group score is taken from the average of every members' score)
N	Total group members

The formula for Classical Participation Assessment:

PK C1 1 = (P.Group 1 + P.Group 2 + P.Group n...)/n

Annotation :

PK	= Classical Learning Participation
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P.Kel	= Group's 1 Learning Participation
1	(Group 2 and so on. Using code PK 2, PK 3, and so on, group score is taken from the average of every members' score)
N	= Total groups in a class

Learning participation level assessment, both individually and in groups range of scores was 1-4 based on the quantity of each, then given predicate as outlined in Table 2. Then it will be compared in each cycle to know whether the given action is success or not.

Table 2. Learning Participation's Grade Predicate

Grade Predicate :			
The quantity of Each Participation Indicators	Score	Alphabet	Predicate/ Participation Rate Criteria
1 Times	1	D	Inactive / Very Low Activity
2 Times	2	C	Quite Active / Quite High activity
3 Times	3	B	Active/ High Activity
4 Times/ more	4	A	Very Active/Very High Activity

Learning participation's comparison between cycles

Individual Learning Participation :

PI Cycle 1: PI Cycle 2: PI Cycle 3

(In this section, individual participation is compared one-by-one in the whole cycle)

Groups Learning Participation :

P.Group 1 Cycle 1 : P.Group 2 Cycle 2 : P.Group 1 Cycle 3

(In this section, learning participation of each group is compared one-by-one in the entire cycle, P.Group 1 indicates the formula for group 1, P.Group 2 for group 2 and so on)

Classical Learning Participation:

$$PK = (\bar{X}PI \text{ Cycle 1} + \bar{X}P. \text{Group Cycle 1})/2 : (\bar{X}PI \text{ Cycle 2} + \bar{X}P. \text{Group Cycle 2})/2 : (\bar{X}PI \text{ Cycle 1} + \bar{X}P. \text{Group Cycle 1})/2$$

Student's Comprehension Level Analysis

Individual Comprehension Level Analysis (Individual Grade)

The individual grade has taken from individual assignments and tests conducted in every cycle. The test sheet contains @ five questions for assignment and @ five questions for individual tests so every cycle will be consists of 10 questions. The range of scores is 1-100, which is every question in the assignment and individual test has

weight 20. The level of analysis is determined by the assessment rubric as presented in Table 3.

Table 3. Student's Comprehension Level Assessment Rubric (Individual Grade)

Cycle	Assignment (Assignment 1, 2, 3)	Individual Test (TI-1, 2, 3)	Average of Individual Grade
Cycle 1	Total question = 5 Each Question Score = 20 Minimum score = 100	Total question = 5 Each Question Score = 20 Maximum score = 100	$\bar{X}_{TKI-S1} =$ (Assignment 1 + TI-1)/2
Cycle 2	Total question = 5 Each Question Score = 20 Minimum score = 100	Total question = 5 Each Question Score = 20 Maximum score = 100	$\bar{X}_{TKI-S2} =$ (Assignment 2 + TI-2)/2
Cycle 3	Total question = 5 Each Question Score = 20 Minimum score = 100	Total question = 5 Each Question Score = 20 Maximum score = 100	$\bar{X}_{TKI-S3} =$ (Assignment 3 + TI-3)/2

Comparison of Individual Grade Between Cycles

$$\bar{X}_{TKI-S1} : \bar{X}_{TKI-S2} : \bar{X}_{TKI-S3}$$

Annotation :

\bar{X}	= Average of Grade	S1	= Cycle 1
Tags	= Assignment	S2	= Cycle 2
TI	= Individual Test	S3	= Cycle 3
TKI	= Individual Cognitive Test		

Grade's Predicate :

Score	Alphabet	Predicate/Level of Comprehension Criteria
91 - 100	A	SP/PSBK
76 - 89	B	P/PBK
66 - 75	C	CP/PCBK
56 - 65	D	KP/PKBk
≤ 55	E	TP/PBr

Group's Comprehension Level Analysis (Group's Grade)

This analysis was about the calculation of groups performance which is taken from the direct group test when the action given in the classroom. This analysis will measure students' comprehension in groups, as well as to assess of the learning process regarding student's learning participation (conducted through observation with observation sheets as the instrument). Total questions are five questions with the weight every answer is 20, and the total score is 0-100. The score that has been achieved in a group will be the score/grade of every group's member.

This analysis will be referring to the assessment rubric as same as the individual cognitive test rubric represented in Table 4.

Table 4. Student Comprehension Level Assessment Rubric (Group's Grade)

Cycle	Group's Cognitive Test (TKK)	Average of Individual Grade
Cycle 1	Total question = 5 Each Question Score = 20 Maximum score= 100	\sum Grade TKK-S1= SS1+SS2+SS3+SS4+SS5
Cycle 2	Total question = 5 Each Question Score = 20 Maximum score= 100	\sum Grade TKK-S2= SS1+SS2+SS3+SS4+SS5
Cycle 3	Total question = 5 Each Question Score = 20 Maximum score= 100	\sum Grade TKK-S3= SS1+SS2+SS3+SS4+SS5

Comparison of Group's Grade Between Cycles

$$\sum \text{Grade TKK-S1} : \sum \text{Grade TKK-S2} : \sum \text{GradeTKK-S1}$$

Annotation :

\sum	= Total	SS1	= Question ScoreNumber 1
TKK	= Group's Cognitive Test	SS2	= Question Score Number 2
S1	= Cycle 1	SS3	= Question Score Number 3
S2	= Cycle 2	SS4	= Question Score Number 3
S3	= Cycle 3	SS5	= Question Score Number 3

Grade's Predicate :

Score	Alphabet	Predicate /Comprehension Level Criteria
91 – 100	A	SP/PSBK
76 – 89	B	P/PBK
66 – 75	C	CP/PCBK
56 – 65	D	KP/PKBk
≤ 55	E	TP/PBr

Class's Comprehension Level Analysis (Classical Grade)

The classical grade is the stage when the researcher recapitulates the average of classical grades from assignments, individual tests, and group tests. This analysis aims to know the students' classically comprehension from each cycle so that the researcher can determine the success of the actions that given in classically. Classical grade analysis includes the class's average grade which is obtained both from individual and group achievements in every cycle. This analysis uses reference rubric as outlined in Table five (5).

Table5. Student Comprehension Level Assessment Rubric (Classical Grade)

Cycle	Classical Grade (NK)
Cycle 1	$NK S1 = \frac{\sum \text{Grade TKI-S1} + \sum \text{Grade TKK-S1}}{2}$
Cycle 2	$NK S2 = \frac{\sum \text{Grade TKI-S2} + \sum \text{Grade TKK-S2}}{2}$
Cycle 3	$NK S3 = \frac{\sum \text{Grade TKI-S3} + \sum \text{Grade TKK-S3}}{2}$

Comparison Between Cycle

$$\sum NK-S1 : \sum NK-S2 : \sum NK-S3$$

Annotatiton :

\sum	= Total	S1	= Cycle 1
NK	= Classical Grade	S2	= Cycle 2
TKI	= Individual Cognitive Test	S3	= Cycle 3
TKK	= Group Cognitive Test		

Grade Predicate :

Scor	Alphabet	Predicate/Comprehension Level Criteria
91 - 100	A	SP/PSBK
76 - 89	B	P/PBK
66 - 75	C	CP/PCBK
56 - 65	D	KP/PKBk
≤ 55	E	TP/PBr

RESULTS

The initial conditions of students' learning participation and comprehension, in Class 1-D, Management Department FEB-UMM.

Economics and Business Mathematics Learning at Economics and Business Faculty still use conventional learning methods with tutorial method. By this method, students' learning outcomes are relatively low. So it is necessary to change the learning method to be Team Games Tournament (TGT) method, in order to improve students' learning participation and comprehension.

Economics and Business Mathematics is a required course for students' in the management department,

FEB-UMM. Students of Management Department Class 1-D, Economics and Business Faculty, University Muhammadiyah Malang have difficulty to understand the implementation of sequence and series. The number of students class 1-D management is 55 people, but eight students are no longer active due to moving to another university, so the number of students becomes 45 people. Economics and business mathematics courses are held in the odd semester 2017/2018.

A pre-test was carried out before the TGT method was applied to know the level of students of class 1D's learning participation and comprehension. Pre-test results show that in subject matter, the

implementation of sequence and series, the student of 1-D's grades were still low at 61.04 or categorized C+. So, It can be interpreted that students' comprehension only at the Understand Enough or Good Understanding category, and the student's participation at a quite active category.

Student's participation and comprehension, both individually and in groups are still in the sufficient category, before the TGT was applied as the learning method. During the learning process only 30% of students who were actively asking a question and participating in the class, so that the cooperative learning method is needed in class 1-D.

After in-depth observations, the results obtained that students of class 1-D were excited to learn economics and business mathematics combined with games. The application of cooperative learning with the TGT (Team Games Tournament) method is needed to

improve student learning participation and comprehension.

Students' Learning Participation Levels Analysis (Process' Assessment Through Observation)

Individual Learning Participation

The target variable of corrected action through this study is the level of students' learning participation carried out through observation techniques observation sheet as an instrument. The learning participation level of every individual in class 1-D was increased in every cycle, and all the students were active in Team Games Tournament (TGT) learning. From class' average grade, individual learning participation is also increasing in the cycle 1 2,31003 included in category C or quite active/ quite high activity. In cycle 2 the class' average grade is 2.991 that categorized as C or quite active/ quite high activity. In cycle 3 the average grade is 3.1641, that categorized as B or high activity.

Groups Learning Participation

Table 6. Group's Learning Participation

Groups	Cycle 1		Cycle 2		Cycle 3	
	Grade	Alphabet	Grade	Alphabet	Grade	Alphabet
Group 1	2,942	C	2,999	C	3,313	B
Group 2	2,531	C	3,041	B	3,280	B
Group 3	2,884	C	3,695	B	3,705	B
Group 4	2,587	C	3,228	B	3,483	B
Group 5	2,695	C	3,140	B	3,396	B
Group 6	2,067	C	2,853	C	3,09	B
Group 7	2,778	C	3,415	B	3,584	B
Group 8	2,597	C	3,27	B	3,438	B
Average	2,635	C	3,205	B	3,406	B

Group 1's grade learning participation in cycle 1 is 2,942, categorized as C quite active, in cycle 2 is 2,999 categorized as B or active predicate, in cycle 3 3,313 still categorized as B or active or high activity. Overall, the 8 group's learning

participation level in class 1-D increased from cycle 1 by 2,635, categorized as C or quite active, in cycle 2 it is increasing become 3,205 or categorized as B, and in cycle 3 become 3,406 categorized as B or active predicate.

Classical Learning Participation**Table 7. Classical Learning Participation**

Cycle	Grade	Alphabet	Predicate
Siklus 1	2,472	C	Quite Active/ Quite High Activity
Siklus 2	3,058	B	Active/ High Activity
Siklus 3	3,284	B	Active/ High Activity

The level of classical learning participation has increased in every cycle so that the given actions in the classroom can be declared victorious. In cycle 1, the level of student learning participation was 2.472 categorized as C or quite active or quite high activity. In cycle 2, the level of student learning is 3,058 categorized as B or active/high activity. Moreover, in cycle 3 is 3.284 also categorized as B.

**Student's Comprehension Level
Individual's Comprehension Analysis
(Individual's Grade)**

The level of individual comprehension in economics and business mathematics courses, the individual grade is taken from individual assignments and tests that held in every cycle. The average individual's grade in cycles 1, 2 and 3 has increased so that the level of comprehension and activity also increases in every cycle. In the first

cycle, is 89.9, categorized as B or good understanding / understand, and the predicate of activity is also B or Active / High Activity. In cycle 2 is 95.5, categorized as A or Very Understand / Very Good Understanding, and the predicate of activity also A or Very Active / High Activity. In cycle 3 it is 96.6 categorized as A which is Very Understanding / Very Good Understanding, and the predicate of activity is also A or Very Active / High Activity.

**Group's Comprehension Analysis
(Group's Grade)**

The analysis of the group's performance/ work is taken from the test that should have done in groups during the learning process or when the actions given in the classroom. The grade/score achieved by each group can be seen in Table 8.

Table 8. Group's Grade Class 1-D

Grade	Cycle 1		Cycle 2		Cycle 3		Average Cycle	
	Grade	Alphabet	Grade	Alphabet	Grade	Alphabet	Grade	Alphabet
Grade 1	55	D	100	A	100	A	85	B
Grade 2	100	A	100	A	100	A	100	A
Grade 3	100	A	100	A	100	A	100	A
Grade 4	100	A	100	A	100	A	100	A
Grade 5	85	B	100	A	100	A	95	A
Grade 6	65	D	75	C	90	B	76	B
Grade 7	55	D	70	C	85	B	70	C
Grade 8	85	B	90	B	100	A	91	A
Average	80,62	B	91,87	A	96,87	A	89,62	B
e	5		5		5		5	

Annotation:

A = SP/PSBK (very understand/ very good understanding)

B = P/PBK (understand/good understanding)

C = CP/PCBK (quite understand/very good understanding)

D = KP/PKBK (don't quiteunderstand/quite not good understanding)

E = TP/PBR (don't understand/ bad understanding)

The performance of Group 1 getting increased from cycle 1 by 55, cycle 2 by 100, and cycle 3 by 100 with the average grade is 85, that categorized as B which means Good Understanding. The optimal grade of groups 2, 3 and 4 in every cycle is 100; consequently, the average of each cycle is 100, that is categorized as A or very understand/ very good understanding.

Group 6's scores more increase from cycle 1 by 65, cycle 2 by 75, and cycle 3 by 90 with the average score of 76 that is categorized as B which means good understanding. Group 7's grade also increases from cycle 1 by 55, cycle 2 by 70, and cycle 3 by 85 with average 70 which is categorized as C, or quite understand. Cycle 1's grade for group 8 is 85, cycle 2 is 90, and cycle 3 is 100; hence the average grade is 91 so its categorized as A or very understand or

very good understanding. The comprehension level of 8 groups in class 1-D is improving from the first cycle that is 80,625 and categorized as B or understand, at the second cycle it becomes 91,875, categorized as A or very understanding, and at the third cycle its become 96,875 that categorized as A or very understanding

Comprehension Level Analysis (Classical Grades)

The Class' comprehension level or classical grade is a classical average, both from individual tests and group tests. The comprehension that achieved by students classically can be known from its every cycle so that the ratio between cycles is known and uses to determine whether the actions in classically is success or not. The classical grade will be shown in Table 9.

Table 9. Classical Value

Cycle	The Average of Classical Participation Level	Alphabet	Annotation
Cycle 1	85,4	B	P/PBk
Cycle 2	93,6	A	SP/PSBk
Cycle 3	96,7	A	SP/PSBk

From Table 9 can be inferred that average of classical participation has increased, in cycle 1 the classical average grade is 85.4 and categorized as understanding / good understanding, in cycle 2 the classical average grade is 93.6 which mean very understand / very good understanding, and in the cycle 3 classical average grade is 96.7 that is categorized as good understanding.

Economics and business mathematics learning was done by classroom action research method, which consists of three cycles. Each cycle consists of some stages that are planning, implementation, observation, and reflection. Pre-action was done before the action in the form of initial observation and pre-test.

Description of Learning Cycle 1

a. Plan

In the first learning cycle on December 7, 2017, researcher do diagnose and identification the initial problem, making an action plan, preparing learning devices (syllabus, lesson plans, material, media, and assessment instruments) for cooperative learning by TGT method, preparing identity cards for group activities, and also forming an 8 heterogeneous group which consist of 5-6 people.

b. Act & Observe

Learning activity in cycle 1 is consists of 3 credits (3 × 50 minutes) according to the syllabus and RPP that have been made. The learning process is using cooperative learning by Teams Games Tournament (TGT)

method. The learning steps are as follows:

1. In the beginning, lecturer conveys the learning objectives and the course subject matter, sequence and series.
2. The lecturer creates groups that consist of 5-6 heterogeneous, both in gender and students' rank in the class. In this group, they will cooperate in discussing the material that has been taught, doing the exercises, examining and correcting misconceptions if their group mates make mistakes.
3. After the discussion, the lecturer gives games to students. This game consists of questions about the subject matter that given by the lecturer to students. This game aims to test how much knowledge that has been gained by every group members before they will be representing their group in the tournament. Someone in the group takes a numbered card and answers the question that matches the number on the card. Students who answer the question correctly will get the score. This score will be collected for the tournament.
4. After completing the game, every group will calculate the total score are gained and preparing the tournament which will be held after the end of the subject matter. Students also will conclude that subject matter.
5. The lecturer is giving assignments to do at home.

During the learning process, two observers monitor lecturers and students' activities in class. The observer records every singles activity in the classroom during the learning process into the observation sheet that has been provided. In the next meeting, the lecturer conducts a test to determine the students'

mathematical communication skills about the subject matter that have been given in cycle 1. This test consists of 5 questions that should be answered in 50 minutes. This test results in cycle 1 show that the average level of individual learning participation is 2,310, average group grade is 2,635, the average classical grade is 2,472 from its maximum score, 4. The average level of individual comprehension is 88,9, the average of group grade is 80,625, the average of the classical grade is 85.4 from its maximum score, 100.

c. *Reflect*

Reflection is doing based on data obtained from the observation sheet. According to the observation results of two observers in cycle 1, lecturer's activity in the learning process needs to be improved, especially in time the management and in mastering the subject matter. It's also found that the media that used in the learning process is less attractive to students. In this first cycle, many passive students are not familiar with the TGT learning method due to the lack of initial information carried out by the lecturer.

d. *Revise*

There are suggestions for improving the shortcoming in the first cycle explained above. That suggestions are: preparing more interactive learning media to attract students so that students will be feeling enjoy and more enthusiast to participating during the learning process. Lecturers must be able to manage time and manage classes well, and at the beginning, the lecturer must provide a clear direction about the whole of learning activities that they will do; therefore there will be no students who are confused about TGT method.

Description of Learning Cycle 2

After the first cycle has done, then there will be an evaluation for the first cycle on the second cycle that held on December 14, 2018. As in the first cycle, the second cycle is also carried out by some steps as follows:

a. *Plan*

Based on the evaluation of a few shortcomings explained above, the lecturers planning that next meeting must be better than the previous meeting. The indicators that will be delivered in cycle 2 are about the application of sequence and series, and the lecturer provides clear instructions about the TGT learning system.

b. *Act & Observe*

In accordance with RPP, learning was carried out with the steps of TGT learning with some of the improvements mentioned above. As in the first cycle, two observers in the second cycle were observing TGT learning in the classroom. This two observer records everything that occurs during the learning process. In the next meeting, the teacher conducts a test to determine which how much students' mathematical communication skill about the subject matter that has been given in cycle 2. This test consists of 5 questions that must be done in 50 minutes. The test results show that in the cycle 2 the average level of individual learning participation is 2,912, average group grade is 3,205, the average classical grade is 3,058, from its maximum score of 4. The average level of individual understanding is 95,5, average the group grade is 91.875, the average classical grade is 93.6 from a maximum score of 100.

c. *Reflect*

Reflection is doing based on data obtained from the observation sheet. According to the observation results of two observers in cycle 2, lecturer's activity in the learning

process needs to be improved so that students' learning participation and comprehension will increase.

d. *Revise*

From the analysis at reflection stage, it can be inferred that during the learning process in cycle 2 there are still few shortcomings in the learning process as following there are some passive students, and the lecturer still couldn't manage time well. There is a suggestion for improving these shortcomings, that suggestion is improving students' participation by giving high learning motivation to students.

Description of Learning Cycle 3

The shortcoming in cycle 1 that has been improved, but there are still a few in cycle 2 that are student activities at the time of learning must be improved, and lecturers still can't manage the time effectively. The indicator that is delivered in cycle 3 is the application of sequence and series.

a. *Act & Observe*

Cycle 3 of learning was held on December 21, 2017, as guided in RPP that have been arranged before, which is adjusted to RPP using TGT learning method. The TGT learning steps are the same as the learning process in the previous cycles plus improvements in the next cycle.

During the learning process observer recording all activities in the class on the lecturer and students activities' observation sheet. In the next meeting, the teacher conducts a test to determine which how much students' mathematical communication skill about the subject matter that has been given in cycle 3. This test consists of 5 questions that must be done in 50 minutes. The test results show that in cycle 3 the average level of individual learning participation is 3.164, average group grade is 3.406, the average classical grade is 3.284, from its

maximum score of 4. The average level of individual understanding is 96.6, average the group grade is 96.875, the average classical grade is 96.7 from a maximum score of 100. The activities of lecturers in cycle 3 are better than in cycle 1, and cycle 2, the shortcomings found in during the learning process also have been improved.

b. Reflect

Reflection step is according to the data obtained from the observation sheet. Based on the result of that observation in cycle 3, it is shown that lecturer's activity in the learning process has been improved. From that result can be inferred that the learning process in cycle 3 is better than the previous cycles. Based on the implementation of learning activities in cycles 1 through 3, the learning activities progress of

lecturer and students is getting better than before. Suggestions for improvement in cycle 3 are lecturers must be able to maintain the learning activities and also to implementing other learning models, so that students feel happy, attracted, and excited in learning economics and business mathematics course.

c. Revise

After the analysis's steps above it can be concluded that during the learning process in cycle 3 almost all students actively participate in the learning activities. The lecturer can manage the time effectively. Lecturers should give the students' high motivation and spirit to learn so that their activity will increase. The increasing that happen in every cycle can be seen in Table 10 below:

Table 10. Student of 1-D Class Test Result

Annotation Cycle	Partisipasi Belajar Mahasiswa			Tingkat Pemahaman Mahasiswa		
	Individual	Group	Classical	Individual	Group	Classical
Cycle 1	2,310 (C)	2,635 (C)	2,472 (C)	89,9 (B)	80,625 (B)	85,4 (B)
Cycle 2	2,912 (C)	3,205 (B)	3,058 (B)	95,5 (A)	91,875 (A)	93,6 (A)
Cycle 3	3,164 (B)	3,406 (B)	3,284 (B)	96,6 (A)	96,875 (A)	96,7 (A)

Table 10 depict that individual learning participation level in class 1-D is improving in term of average in every cycle, and the students are active in learning with Team Games Tournament (TGT) model. From the average class grade, individual participation is improving from cycle 1 that is 2,31003 and categorized as C or quite active, in cycle 2 is increasing become 2.9112 still categorized as C or quite active. In cycle 3 the average class grade is 3.1641 categorized as B or high activity.

Overall the learning participation level of 8 groups in class 1-D is improving from cycle 1 until cycle 3. In cycle 1 groups' learning participation grade is 2,635 categorized as C or quite active. In cycle 2 it becomes 3,205 categorized as B or active/ high activity, and in cycle 3, it increasingly becomes 3,406 still categorized as B active/ high activity.

The classical learning participation in every cycle is also getting higher so that the actions that given in class is success. In cycle 1 students' learning participation grade is 2,472 categorized as C or quite active/ quite high activity. In cycle 2 it becomes 3,058 categorized as B or active/ high activity, and in the cycle 3 it increasingly becomes 3,284 still categorized as B active/ high activity.

The individual average grade in cycle 1,2, and 3 is improving so that the level of activity and comprehension is also increasing in each cycle. In cycle 1 individual average grade is 89,9 categorized as B or which means understand/ good understanding and active/ high activity. In cycle 2 it becomes 95,5 categorized as A which means very understand/ very good understanding and very active/ high activity. In cycle 3 it increasingly becomes 96,6 still as A which means very understand/ very good understanding and very active/ high activity.

Overall the comprehension level of 8 groups in class 1-D is improving from cycle 1 till cycle 3. In cycle 1 is 2,635

categorized as B which means understand. In cycle 2 it becomes 91,875 categorized as A which means very understand, and in cycle 3 it is increasingly become 96,875 and categorized as A or very understanding.

The average of classical grade also improving, from cycle 1 is 85,4 categorized as understand/ good understanding, in cycle 2 the average of classical grade become 93,6 categorized as very understand/ very good understanding, and in cycle 3 it becomes 96,7 categorized as very understand/ very good understanding.

From the description above, the average of students' learning participation in cycles 1 until cycle 3, can be inferred that the average of individual grade was increased by 21,3%, the average group grade was increased by 19,2%, the average of classical grade was increased by 20,3% which is categorized as active criteria. The students' average comprehension grade in cycle 1 until cycle 3, for the individual grade, increased 6,7%, the average group's grade was increased 16,2%, and the average classical grade was 11,3% which is categorized as understand criteria. Students show a positive attitude towards economics and business mathematics learning using *Teams Games Tournament* (TGT) method and they are showing good response towards cooperative learning in *TGT* model.

CONCLUSION

According to the result of this study, it can be inferred that using Teams Games Tournament (TGT) learning model will be increasing students' participation and comprehension in economic and business mathematics course, with the subject matter, is the application of sequence and series. This can be seen from the pre-test's results on the subject matter, the application of sequence and series, before using the TGT method its average grade of class 1-D is still low at 61.04 which is categorized as C+. It can

be interpreted that students quite understand and active in learning participation.

Student's learning participation and comprehension after the Teams Games Tournament (TGT) method applied sare increasing from cycle 1 until cycle 3. From student's participation average grade in cycles 1 until 3 can be concluded, that individuals average grade was also increased 21.3%, the average group grade was 19.2%, and the average classical grade was 20.3% which is categorized as active criteria. Students' comprehension average grade in cycles 1 to 3 for individual grade increased by 6.7%, the average group grade was 16.2%, and the average classical grade was 11.3% which is categorized as understand criteria. Students show a positive attitude towards economics and business mathematics learning using Teams Games Tournament (TGT) method and student responses to TGT type cooperative learning.

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