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The Dynamics of Two Study Models (Team Game Tournament and Numbered Head Together) in Increasing Mechanical Engineering Students of Makassar State University (UNM) Knowledge of The Concept Machine Element

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Abstract. This research aims to identify the differences in the knowledge of the concept machine element by mechanical engineering students (UNM) using Team Game Tournament (TGT) and Numbered Head Together (NHT) models. The sample size of this research is 76 students taught with both models, with 36 acting as control. The result of the research shows that there were no significant differences between the mechanical engineering students using study Team Game Tournament (TGT) model and those using Numbered Head Together (NHT) at machine element class. The students' knowledge of the concept, machine element prior to the use of Team Game Tournament (TGT) model was 17.43%, while after the model was used, it became 20.62%. Also for the group that used NHT, before the model was used, the students' knowledge was 13.57%; while after the model was used, it became 20.45%. It shows that the modes improved the students' knowledge by 13.03%. From the calculation using SPSS, significant result of 2-tailed 0.796 > 0.05 was obtained. If the result obtained is (2-tailed) bigger than 0.05, it is significant; hence the result of this study is significant. Independent-Sample t Test was applied to test the research hypothesis through comparison. The test was significant at $\alpha = 0.05$ level. In conclusion H_o is accepted while H_1 is rejected. There are no differences in the students' knowledge of machine element using Team Game Tournament (TGT) and those taught with Numbered Head Tongether (NHT).

Key word: Study Model, Team Game Tournament, Numbered Head Together.

INTRODUCTION

Success in education is based on how far teachers and lecturers develop their skills to move education forward. Machine is part of a construction having forms and separate functions and can be utilized as elements of binder, displacement, transmission, buffer, lubricant, as well as welding joint, nut, bolt, rivet and joggle.

Teachers that teach the concept machine use discourse method (conventional), where students sit quietly, take notes and memorize. With this method, there is no interaction between lecturers and students, making it difficult for them to comprehend the concept. This results in the poor knowledge of the students. Out of 60

students learning the concept machine, no student had A, 20 had B while 40 had C. It means that most of the students do not understand the concept, leading to poor learning and performance.

Team Game Tournament (TGT)

In this study, the students were placed in learning batches of 5-6 students based on their performance, gender, and race. According to Slavin study, co-operative TGT consist of 5 steps, which is class presentation, learning in team, game, contest (tournament) and team recognition.

According to Suarjana (2000:10) in Istiqomah (2006), Team Game Tournament (TGT) method has the following advantages: 1) Students are involved in the teaching and learning process 2) Allows students to socialize with each other, 3) Motivates higher learning in students, 4) Results in better learning; while Numbered Head Together (NHT) gives opportunity to educate students where they are made to share their ideas and give precise answers.

From the above as well as other relevant research results, the application of Team Game Tournament (TGT) and model Numbered Head Together (NHT) in a study can increase results of learning and students' learning performance. So researchers who intend to do research in this area can apply the models used in this work.

Literature Review

Understanding Learning

Learning is a transformation of behaviour that is permanent; it is obtained from the result of training and experience as well as sharing of experience. Transformation not only increases science, but also forms skill, efficiency, position, behaviour, patterned thinking, personality etc.

Conceptual Review

According to Taxonomy Bloom Revision by Krathwohl and Anderson, (2001), the result of learning covers knowledge dimension: (1) Factual knowledge, that is information obtained across different sections or fundamental areas in a science discipline, such as knowledge about terminology and different details, (2) Conceptual knowledge shows the interrelationship between small fundamental elements functioning together; they include scheme, idea, model and theory, (3) Procedural knowledge shows how to do something, either having routine or new character and (4) Cognitive knowledge is knowledge in general and knowledge about self.

According to Lindgreen in Suprijono, 2010:7), the result of learning covers efficiency, information, understanding and position.

Performance, from cognate domain in Bloom Taxonomy which has been revised, is defined as follows: (C1): This performance remembers relevant information from long-term memory when the information is required. (C2) Comprehensive performance constructs meaning from messages sent in so many forms, including oral air mechanism or written form. (C3) Application of performance involves executing procedures in a certain situation. The next is (C4) - analyses performance. It decomposes concept from previous element, and determines how the elements circulate and integrate to become one unit. (C5) Evaluation performance: makes assessment (judgement) based on certain criteria or standard angle blocks. And lastly (C6) Creative performance: this strings up or organizes various elements to become one coherent and clear unit.

Study Model

Mills in Suprijono, 2009:45) has a notion that model is an accurate and actual representation of a process. People act based on a model. Gagne (1985) defines the term as, "a set of events embedded in purposeful activities that facilitate learning". It refers to activity that is intentionally created with a view to facilitate the learning process.

Team Games Tournament (TGT)

TGT is a study type where students are grouped to learn in batches of 5-6 people based on performance, gender, and race.

Students working in a small group: they are placed in learning batches or group of 5-6 members based on performance, gender, and race. With heterogeneity, members of each batch are expected to help each other; more capable students are expected to help the less capable students in becoming perfect in their learning. This causes growth and awareness among students, thereby resulting in better learning process.

Tournament Game: In this game, every competing student is chosen from their group. Students representing their batch are placed in tournament tables. Every tournament table is occupied by 5-6 participants, who labour for their members not to repeat the game. In every tournament table, every homogenous participant labours. The game starts with informing the students of the rule of the game and allotting problem cards to them. Problem cards and key are overturned on the table. The rules of the game are as follows; firstly, every player in every table determines the first problem reader and player by toss. Then the player that wins the toss takes the card

Table 1. Game point calculating table for four players.

Player with	Point of amounts of cards obtained
Top Scorer	40
High Middle Scorer	30
Low Middle Scorer	20
Low Scorer	10

Table 2. Game point calculating table for three players.

Player with	Point when card amounts obtained
Top scorer	60
Middle Scorer	40
Low scorer	20

(Source: Slavin, 1995:90**)**

containing the problem number and gives to the problem reader, who reads the problem according to the toss number taken by the player. Hereinafter, the problem is solved by the player himself based on the time frame given to handle the problem. Once the time to solve the problem is completed, the player will read the result of his work which will be answered in an hour by concurrent challenger. Later, the problem reader will unlock the answer and score; this is given to the same player who plays correctly or a challenger who first gives the correct answer.

If all the players' answers are wrong, the card is let out, and the game continues with the next problem card until all the problem cards of the run-out are read, or until the position of a player is turned around clockwise. Every participant in one tournament tables can stand as problem reader, player and challenger. Here game can be done many times on the ground that every participant must have the same opportunity as player, challenger, and problem reader.

Appreciation of batch: Appreciation of group is calculated based on batch score average; it is based on the average point obtained by the batch, while determination of point obtained by each member of group is based on the number of cards obtained, as shown in Tables 1 and 2.

Numbered Head Together (NHT)

As seen above, TGT is a type of study in which students are placed in learning batches of 5-6 members based on performance, gender, tribe or race; however in *Numbered Head Together* (NHT) study model, students

are more active in school activity. NHT is done by dividing students in small batches. Every student in a batch has one different number, and only one student known as 'go forward' presents result of discussion.

Lie in Ernawati, 2010:40) expressed that NHT gives the opportunity to educate participants, allowing them to give their ideas and precise answers. Steps taken in execution of NHT are as follows: 1) Students are divided into batches of 5-6 students and every student in every batch gets serial number. 2) Teacher gives task to each group to do. 3) Group decides answer of the task by considering the most correct one and ascertains that every member of the group knows the answer. 4) Teacher calls one number, and the student with the number reports result of his/her group.

Knowledge of Machine Concept

Arends (2007) "defines idea as knowledge that results from behavior of man after sensing certain object". According to Mayer (2003), "Knowledge is all idea, concept, and man's understanding (it takes initiative to share knowledge". Concept is idea referring to a batch or category where all members of a group have common characteristics (Kauchak *et al.*, 2007).

Conceptual knowledge is the interrelationship between fundamental and different elements functioning together. It covers scheme, idea model and theory. By the above statement, it can be said that conceptual knowledge is yielded through behavior of man in the form of a concept, idea, and understanding proven in a thing or process that is said to be true. A study process is said to be successful if the goals set are reached; for example, machine element works with principles. One part of the

Table. 3. Research planning.

Class	Pre Test	Treadment	Post Tes
K_1	O_1	X_{K1}	O_3
K_2	O_2	X_{K2}	O_4

principles of machine element is joggle. Joggle is an element used to specify machine parts (Sularso and kiyokatsu Suga, 1991).

RESEARCH METHOD

Research planning

This research aims to identify the knowledge difference of students of UNM using co-operative type Team Game Tournament (TGT) and model Numbered Head Together (NHT) as shown in Table 3

Description:
K_1 : Class *Team Game Tournament* (TGT)
K_2 : Class *Numbered Head Together* (NHT)
O_1 : Pre test class *Team Game Tournament* (TGT)
O_2 : Pre test class *Numbered Head Together* (NHT)
X_{K1} : Treatment at class *Team Game Tournament* (TGT)
X_{K2} : Treatment at class *Numbered Head Together* (NHT)
O_4 : Post Test passed to class *Team Game Tournament* (TGT)
O_4 : Post Test passed to class *Numbered Head Together* (NHT)

Research Instrument

Instrument applied in this research is information test result of knowledge of engineering students. The test result of the students' learning was used to measure the extent the students masters what they were taught using Team Game Tournament (TGT) and Numbered Head Together (NHT) models. The test was given in the form of double helix consisting of 40 problems.

Instrument Testing

Validity Test

An instrument of data is said to be valid if the data or information are obtained from accurate variables and if it can give correct gauge, like the one used in this

research. In the analysis of the engineering students' language, product moment Pearson was applied at significant level of 5% to know the correlation between the independent and dependent variables. To know the correlation that exists between the question items and result score, SPSS computer program is used. If the probability is less than 0.05, the instrument is valid.

The test was done on 38 students with significant level of 0,05 obtained by $r_{table} = 0,320$.

Reliability Test

An instrument is said to be reliable if when applied at multiple times and different instances shows consistent result. Therefore, to know the reliability of the instrument used in this work, test the consistency of the questionnaire applied in this research twice or more. To know if the research questionnaire is reliable or not, Cronbach alpha coefficient was applied. The reliability coefficient shows there is a positive correlation between one variable and the others in the questionnaire.

Data Analysis

Comparability Statistical Analysis

This is a comparative research. A quasi experiment design of nonequivalent was used for the control group and experimental group; the control was not selected in random.

Equally, the researcher could not found any significant difference in the knowledge of the students of machine learning using Team Game Tournament (TGT) and Numbered Heads Together (NHT); hence the result of their knowledge of machine element learning concept was measured through information test.

Analysis Clause Test

Normality Test

To test if the research sample type is normal distribution, Normality Test was used. The Kolmogorov-Smirnov test, Goodness of Fit Test (Test K-S) was adopted, that is non-parameteric normality test used for each variable.

Homogeneity Test

Homogeneity test was done using Bartlett's test. Significant value of statistics > 0.05 expressed similar variable.

Hypothesis Analysis

Analysis of hypotheses is important in a research. In this research, independent-Sample t Test was applied to test the research hypothesis through comparation. The test was significant at α = 0,05 level.

RESULT OF RESEARCH

Description of Data

Result of the students' learning was tested by an instrument in the form of double helix (post test., 35 problems). Result of the learning obtained from 76 students showed that 38 students were taught with Team Game Tournament (TGT) and the other 38 were taught with Numbered Head Together. Prior to the use of Team Game Tournament (TGT), the result of the students' knowledge of the machine concept was 17.43%, and after the model was used, the result was 20.62%. The result of the students' learning experiences improved by 13.57%. Before the Numbered Head Together (NHT) model was used, the result of the students' knowledge was 17.47% and after it was used, the result became 20.45%. The result improved by 13.03%.

Analysis Test

Clause test of initial analysis of pre-test was done by double helix with number of problems equals to 40; validity test was done with SPSS 20 programme, resulting in 35 valid problems; 5 problems were cancelled.
Result of Cronbach's Alpha coefficient was > 0.600, indicating that the result of the post test was reliable.
 The post test was in the form of double helix. Out of 40 problems tested 10 were cancelled, while 35 were valid; their reliability was tested by using SPSS 20 programme.

Normality Test

From the analysis result done with SPSS 20 on Team Game Tournament (TGT) 0.980 > 0.05 and Numbered Head Together (NHT), the probability value was 0.918 > 0.05; hence Ho is accepted; it is concluded that both data distribution is normal.

Homogeneity Test

From the analysis done at 95% level and from the data analysis done with SPSS, there was a significant value of 0.128 > 0.05; hence, both data have the same character.

Hypothesis Test

From the calculation done with SPSS, there was significant result of (2-tailed) 0, 796 > 0,05; hence as the result is bigger than 0,05, Ho is accepted and H_1 is rejected. Therefore, there are no differences in the knowledge of the students about machine element using Team Game Tournament (TGT) and Numbered Head Tongether (NHT) models.

CONCLUSION

Based on the result obtained from the data analysis in this research, the following conclusion is made:

1. Result of students' learning is obtained by using a test instrument in the form of double helix (post-test) for 35 problems. Data were obtained from 76 students; 38 of them were taught with Team Game Tournament (TGT) and the other 38, with Numbered Head Together. Prior to the use of Team Game Tournament (TGT), the students' knowledge of the machine concept was 17.43% and after it was used, the result was 20.62%. Their knowledge improved by 13.57%. Prior to the use of numbered head together (NHT), their result was 17.47%, and after it was used, the result was 20.45%. Their knowledge improved by 13.03%.
2. There are no differences in the knowledge of the students taught with both models.

RECOMMENDATION

1. Major chiefs, as component of input and comparison material, should apply Team Game Tournament (TGT) and numbered head together (NHT) learning models in the study of machine element

2. Lecturers should apply both models to increase the result of students' learning.

3. Students should be more active in doing optimal study.

4. Researchers should develop and research further in this area.

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