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# Development of TGT (*Team Game Tournament* ) Cooperative Learning Model to Improve Chemistry Learning Outcomes in High School Students

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***Abstract*:**
*This research is a development research that aims to Analyze Potential and conditions of learners School Tunas Mekar Indonesia 's to developed learning model cooperative TGT in improving learning outcomes of students in the subjects of chemistry , Analyze of process development of learning cooperative TGT to improve the learning outcomes of students the subjects of chemistry , produce product developers an instructional cooperative TGT to improve the learning outcomes of students in the subjects of chemistry and knowing response / user feedback to product developers an instructional cooperative TGT to improve the learning outcomes of students . The research subjects were class XI students of Tunas Mekar Indonesia School in Bandar Lampung for the 2020/2021 school year . The data collection techniques used questionnaires, interviews, and the data analysis techniques used descriptive statistics. Results of research on chemistry learning the material reaction rate has not been optimal so that the need to develop models of learning in accordance with the conditions and the potential of the school, the research design refers to the Borg and Gall are performed only at 6 (six) phases with test results validation matter experts got average score of 3.46 with a decent criteria , the results of the validation test media experts with an average score of 3.59 d ith the criteria of decent and validation of design experts with an average score of 3.9 with the criteria of decent , characteristics of the products developed based on concepts, theories, principles and procedures of Educational Technology in managing effective learning and feedback / responses of users of the products developed shows the percentage of 86.04 % with a title very well.*
***Key Word**: Team Game Tournament Cooperative Learning Model ; learning outcomes ; chemistry .*

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## I. Introduction

Learning problems that need to be solved immediately are the low activity of students in each learning process which causes low student learning outcomes. This is because most teachers apply a very strong teacher-dominated learning model. This is in accordance with the opinion of Abba (2000: 2) who says that most teachers use conventional learning models and are dominated by teachers, resulting in low student activity.

The low completeness of learning chemistry is influenced by student activity. The low activity of learners (students) in the learning process is influenced by the learning model applied by the teacher (Abba , 2000: 2 ). Student activities can be seen from the student's processing proficiency in the learning process. Students who actively participate in the learning process show that these students have proficiency in following the learning process. Therefore the chosen learning model should be able to increase student activity (student centered) and student processing proficiency in learning, so as to increase the standard of learning completeness can be increased.

Completeness of learning chemistry is related to the mastery of chemistry by students. Chemistry learning materials are generally arranged hierarchically, one material is a prerequisite for the next material. As a result, if a student does not master the necessary prerequisites , the student may not be able to master the learning material well. According to Gagne (in Hidayat, 2004: 24) mastery of a knowledge or an ability generally requires mastery of prerequisite knowledge or abilities. Students who do not master the prerequisite material well and do not get attention to the learning process, these students cannot achieve complete learning. Therefore, the learning model applied by the teacher should be able to help students who have low, moderate, and high prerequisite material mastery abilities to achieve learning completeness.

Teacher creativity in applying the learning model is needed, because there is no best learning model. A teacher can combine several existing learning models, so that learning can vary. Combining several learning models can be done by paying attention to the advantages of existing learning models.

Based on the interview chemistry teacher at the School of Tunas Mekar Indonesia p roses learning is done in general are still using learning conventionally by methods lectures and l matter training.

In the lecture met-hod , students only listen to the explanation from the teacher and note things that are considered important, students are only required to memorize the information conveyed by the teacher. In this learning, students tend to only act according to what is instructed by the teacher, as a result student learning outcomes are not good, therefore it is necessary to make efforts to improve the learning process so that students are more active and student learning outcomes can increase. In order to improve learning outcomes it is necessary to developm - ment of the learning model.

Based on the results of the study, it shows that cooperative learning is an effective learning approach in secondary schools and this model is recommended to be applied in chemistry learning (Ramli Abdullah, 2017). Many teachers apply the competitive learning model in their learning (Lie , 2002: 23 ). This model educates students to always compete for a value. To motivate students, a teacher often gives rewards and rewards to students. Rewards and rewards are given to students who successfully meet the demands of the curriculum and vice versa.

There are many types of cooperative learning models, including the type of Jigsaw, STAD, and TGT (Teams games Tournaments). Each of these types has advantages. According to Sularyo (2003: 17) the advantages of the Jigsaw model group learning are the existence of a group of experts who provide learning to members in their group, while the STAD model is the provision of material by the teacher in a more focused manner so that students have a better picture of the topic being studied. Meanwhile, according to Silberman (1996: 182) the advantage of learning tournaments which is a simplified version of "team-game tournaments" or TGT (Teams games Tournaments) is the opportunity for each group to undergo learning sessions between each round in the evaluation stage.

The subject matter of reaction rate solutions contains difficult concepts, requires prerequisite knowledge, and is given to students. As a result, the subject matter of the rate of reaction given to a class requires prerequisite knowledge from the knowledge given in the previous class and this material is a prerequisite for the material given to the class afterwards, so that complete mastery of the material is needed. Therefore, to be able to master the material completely, a learning model is needed that can complete mastery of the material through both teaching by teachers and by students through group learning (cooperative).

The TGT cooperative learning model is a learning model that emphasizes the completion of mastery of the material through group learning (cooperative). Thus, the TGT cooperative learning model ( *games tournament type* ) can be used to convey the subject matter of reaction rates

## II. Material And Methods

The research and development method used in this research is Research and Development (R&D) or often called development according to Sugiono (2012: 297) is a "research method used to produce certain products, and to test the effectiveness of these products". Step Sugiyono research and development according to the measures, namely: (1) the potential and problems, (2) data collection, (3) the design of the product, (4) validation of the design, (5) improvement of the design, (6) test try the product, (7) product revision , (8) usage trial, (9) product revision, and (10) mass production

Of the ten steps of Sugiyono's Modified RnD Product Development, in this study the implementation is only up to the sixth step (6). This was done because of limitations, both in terms of time and cost in this study. Sukmadinata in Abdurahim (2011) states that research and development can be stopped until a final draft is produced, without testing the results. The results or impact of the application of the model already exists, on a limited test to measure the attractiveness of the results of developing the TGT learning model to improve learning outcomes . Development procedure steps :

1. Potentials And Problems

Initial activities before developing researchers made observations in order to find potential and problems at Tunas Mekar Indonesia School. The potential of Tunas Mekar Indonesia School is the availability of complete textbooks in schools. While the problem is that the value of chemistry in the material reaction rate in the tenth grade I MIPA 1 TP 20 19 /20 20 of 15 students who achieve the criteria of minimum completeness only 33% or as much as 5 students, learners only use material obtained from teachers, and the lack of variety of methods used by the teacher makes students less creative. With this potential, the researchers developed the TGT learning model on the reaction rate material . This potential is useful for minimizing learning problems in class and outside the classroom.

2. Data collection

Data collection activities were carried out by examining several theories to analyze needs in more depth and find relevant research literature so that the problems found can be found solutions.

3. Product Design

After collecting data in the previous stage, the next step that the researchers took was to make a content design including,

1. Choose basic competencies.
2. Formulate indicators and learning objectives
3. Develop a lesson plan.
4. Develop Learning Materials .
5. Prepare a map of LKS needs
6. Prepare a written test
7. Compile student evaluations in developing the TGT model

4. Design Validation

Design validation is a process or activity to assess whether the design of the TGT learning model development has been categorized as an effective learning design . This validation is said to be rational validation, because this validation is still an assessment based on rational thinking, not field facts. In the initial product design validation stage, a team of experts consisting of material experts and chemistry teachers were consulted .

Material experts analyze and assess whether the material prepared is in accordance with Competency Standards, Basic Competencies, and Learning Objectives. Chemistry teachers themselves assess the product's viability .

The criteria in determining the expert subject are as follows:

1) Experienced in the field

2) Minimum S2 education or currently pursuing S2 education

The following aspects were validated by the validator:

a) Material Expert Test

Material testing aims to test the completeness of the material, the correctness of the material, the systematics of the material, and various matters related to the material. The material expert examines the aspects of content feasibility, presentation feasibility and contextual assessment. The material expert test used two professional material experts. The procedures at this stage are :

1) Determine the aspects and indicators of the assessment;

2) Develop validation instruments based on assessment indicators;

3) Carry out the validation by the material content expert used ;

4) Analyze the results of the validation to obtain learning material that suits your needs;

5) Formulating recommendations for improvement based on the results of the assessment;

b) Test of Media Experts

The media expert test aims to determine the accuracy of the minimum standards applied in the preparation of the TGT learning model to determine the effectiveness of the model being developed. Test media experts conducted by one lecturer who is an expert in the m edia learning . Expert m edia assess the feasibility aspect of presentation and suitability models of learning TGT . This is done to determine whether the model created is suitable for use as a learning medium or not. If the validated model has met the category and does not need to be revised, the learning media is ready to be implemented in the field

a) Expert design test

The design expert test aims to determine the attractiveness of the product appearance, the clarity of the presentation of the material and the suitability of the image

5. Design Improvements

After the product design is validated through the assessment of material experts and class XI high school learning model experts, researchers make improvements to the product design developed based on expert input.

6. Product Trial

Product testing is an important part of development research that is carried out after the design revision is complete. Product trials are intended to collect data that can be used as a basis for determining the feasibility and attractiveness of the resulting product. Product trials were carried out by means of one-on-one trials , small group trials , and field trials . The trial subjects include the subjects at the following stages: ( a ) one-on-one trials; ( b ) small group limited trials . The trial stages carried out:

a ) One-on-one Trial

The initial product that has gone through the expert testing stage is then tested again on students through individual testing. One-on-one trial subjects were 3 students for each class who had low, medium and high abilities. Students are given a questionnaire to determine the attractiveness of the product to students , ease of use and the role of the product in learning. The results of the questionnaire data are material for revision steps.

b ) Small Group Trials

Initial products are tested one by one, then tested again through small group trials. The sampling technique and testing procedure carried out in small group tests are the same as for individual tests. The difference is only in the number of research samples. The sample in this test amounted to 10 respondents .

**Data analysis technique**

This research is a quantitative descriptive study, using descriptive analysis or descriptive statistics. According to Sugiyono (2016: 147) The descriptive analysis method is:
"The statistical methods used to analyze data in a way mendeskriptifkan or represents data that has been collected as without intending to generally accepted conclusions or generalizations".

The data from the needs analysis obtained from teachers and students are used to prepare the background and determine the level of development program needs to identify needs which then determine the specifications for the TGT Cooperative Learning Model Development . The data obtained through the trial instrument were analyzed using qualitative descriptive statistics. This analysis is intended to describe the data characteristics of each variable. The instrument used has 4 answers, so that the total assessment score can be found using the following formul

:

$$X = \frac{\sum_{i}^{n} = 1^{x_i}}{n}$$

with:

$$x_{i=\frac{Jumlah\ Skor}{Skor\ Maksimal}x\ 4}$$

(Source, Sugiono 2015)
Information: X = final average
$X_i$ = the operational test value of the questionnaire for each student
n = the number of students who filled out the questionnaire

The research data analysis method used descriptive method. Descriptive statistics are statistics used to analyze data in ways that describe or depict the data that has been collected as without meaning make conclusions or generalizations apply to the public. The steps in analyzing the validation instrument data of experts , responses (students and teachers) are as follows:

1. Material Expert Validation Data Analysis

Material expert validation questionnaire related to aspects of content feasibility, presentation feasibility, and contextual assessment with 4 answer choices according to the question content. Each of the answer options has a different score which means the level of validation of the TGT Cooperative Learning Model Development.

2. Media Expert Validation Data Analysis

Questionnaire validation of media experts related to aspects of content quality and objectives, aspects of instructional quality and aspects of technical quality with 4 answer choices according to question content. Each of the answer options has a different score which means the level of validation of the TGT Cooperative Learning Model Development

3. Design Expert Validation Data Analysis

Questionnaire validation from Mediai experts related to aspects of writing text, words or language, design, coloring aspects of graphic aspects and audio visual aspects with 4 answer choices according to the question content. Each of the answer options has a different score which means the level of validation of the TGT Cooperative Learning Model Development

| Score | Eligibility Answers Options |
|---|---|
| 4 | Very good |
| 3 | Good |
| 2 | Not good |
| 1 | Not very good |

The results of the assessment scores of each material expert validator, model expert are then searched for the average and converted to questions to determine the validity and feasibility of the TGT Cooperative Learning Model Development . The following are the eligibility criteria for the average analysis shown in

| Quality Score | Eligibility Criteria | Information |
|---|---|---|
| 3.26 <x ≤ 4.00 | Valid | No Revision |
| 2.51 <x ≤ 3.26 | Enough Valid | Partial Revision |
| 1.76 <x ≤ 2.51 | Less Valid | Partial revision & review of material / media |
| 1.00 <x ≤ 1.76 | Invalid | Total Revisions |

4. Analysis of User Response Data to the product being developed

User response to the product developed can be seen with a questionnaire, it can be seen in the table below:

| Percentage | Weight | Predicate |
|---|---|---|
| 86% - 100% | 4 | Very good |
| 76% - 85% | 3 | Good |
| 60% - 75% | 2 | Enough |
| 55% - 59% | 1 | Not good |
| 00% - 54% | 0 | Not good |

The quantitative data obtained based on the assessment were then analyzed using the following steps:

a. Calculating the total score of each indicator (R)

b. Calculate the percentage of each indicator with a formula

$$NP = \frac{R}{SM} \times 100\%$$

(Ngalim Purwanto, 2012: 102)

**strument is research**

The instruments used in this study consisted of:

1. Product feasibility testing instruments by material experts
2. Product feasibility testing instrument Media expert
3. Product Feasibility Testing Instruments Design Experts
4. User Response Instruments

## III. Result

The result of the development carried out by this researcher is to develop the TGT ( *team games tornament)* cooperative learning model to improve student learning outcomes. Based on the procedures that have been described, the results of design validation were obtained in several validators, including a chemical expert validator, a media expert validator and a design expert validator in accordance with the competencies of expert validation and predetermined criteria. Material expert validation was carried out to assess whether the design the development of TGT ( *team games tornament )* cooperative learning models to improve student learning outcomes in accordance with core competencies, basic competencies and learning objectives. The aspects that were assessed by material expert validators were the aspects of content feasibility, presentation feasibility aspects and contextual assessment aspects which consisted of 10 indicators. Recapitulation of expert validation can be seen in the table below :

Recapitulation of material expert validation

| No. | Aspect | Validator 1 | Criteria |
|---|---|---|---|
| 1 | Content eligibility | 3,4 | Well worth it |
| 2 | Serving eligibility | 3.0 | Decent enough |
| 3 | Assessment aspects contextual | 4 | Well worth it |
| **Average Score** | | **3.46** | **Well worth it** |

The recapitulation of the validation of material experts got an average score of 3.46 with appropriate criteria, it can be concluded that the development of the TGT cooperative learning model ( *team games tornament)* to improve student learning outcomes is feasible for use in chemistry subject matter reaction rate. Data from table Recapitulation of material experts can be seen in the form of Figure below.

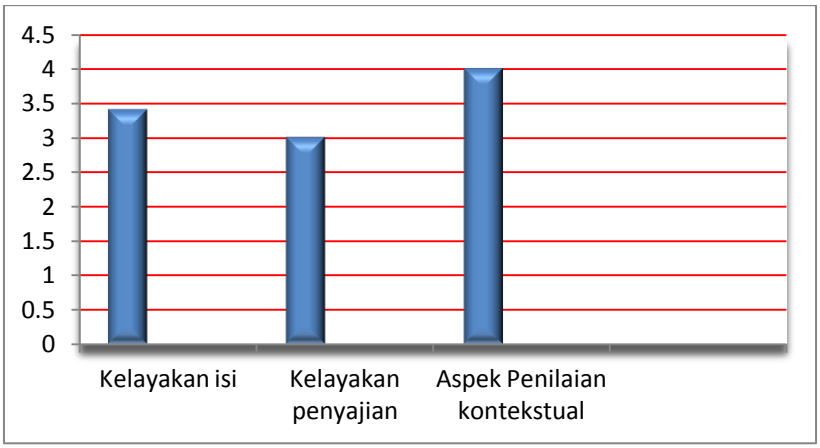



Chart of material expert recapitulation

**Media Expert product testing**

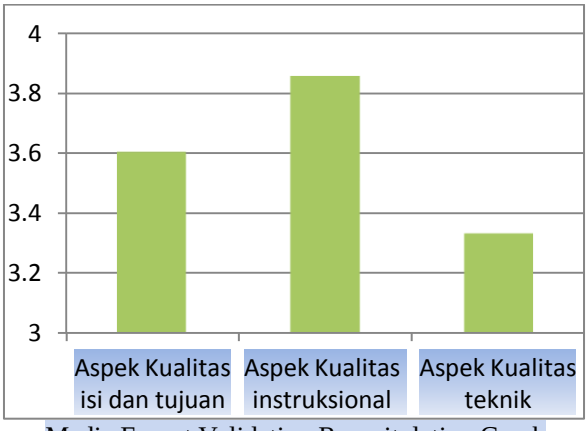
The validation of media experts is used as a reference to improve whether the media contained in the development has been categorized as feasible learning. The assessment of media experts consists of three aspects, namely aspects of content quality and objectives, aspects of instructional quality and aspects of technical quality. The results of the validation can be seen in table 4.8 below:

The table of the results of the validation of the media experts explained that the aspects of content quality and objectives got a score of 3.6 with valid criteria, the instructional quality aspects had a score of 3.85 with valid criteria and for the technical quality aspects with a score of 3.33, the criteria were valid. For the recapitulation results of natural validation can be seen in the table below:

Table summarization of media expert validation

| No. | Aspect | Validator 1 | Criteria |
|---|---|---|---|
| 1 | Aspects of content quality and purpose | 3.60 | Well worth it |
| 2 | Aspects of Instructional Quality | 3.85 | Well worth it |
| 3 | Technical Quality Aspects | 3.33 | Well worth it |
| **Average Score** | | **3.59** | **Well worth it** |

From the recapitulation table of material expert validation with an average score of 3.59 with the validation criteria "Feasible", it can be concluded that the development of the TGT ( *team games tornament)* cooperative learning model to improve student learning outcomes is feasible for use in chemistry subject matter reaction rate. From table recapitulation of expert validation media dap at also seen in the picture




Media Expert Validation Recapitulation Graph

**Product testing Design experts**

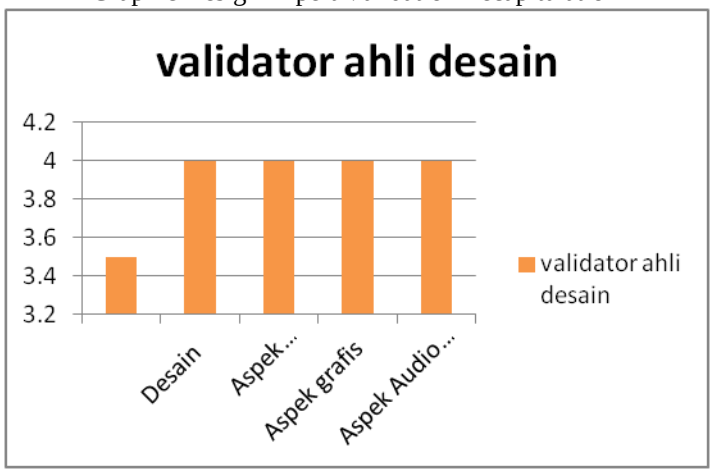
Media expert validation is used as a reference to improve whether the product design contained in the development has been categorized as a feasible development product. Design expert judgment consists of aspects of writing text, words or language, design, coloring aspects, graphic aspects and audio visual aspects. Recapitulation validation of design experts can be seen below:

Recapitulation of design expert validation

| No. | Aspect | Validator | Criteria |
|---|---|---|---|
| | | 1 | |
| 1 | Aspects of writing text, words or language | 3.5 | Well worth it |
| 2 | Design | 4 | Well worth it |
| 3 | Aspects of Coloring | 4 | Well worth it |
| 4 | Graphic Aspects | 4 | Well worth it |
| 5 | Audio Visual Aspects | 4 | Well worth it |
| **Average Score** | | **3,9** | **Well worth it** |

Recapitulation of design expert validation with an average score of 3.9 with the validation criteria "Feasible", it can be concluded that the development of the TGT cooperative learning model ( *team games tornament)* to improve student learning outcomes is feasible for use in chemistry subjects, reaction rate material. From the table , the equatorial validation of design experts can also be seen in the image below

Graphic Design Expert Validation Recapitulation

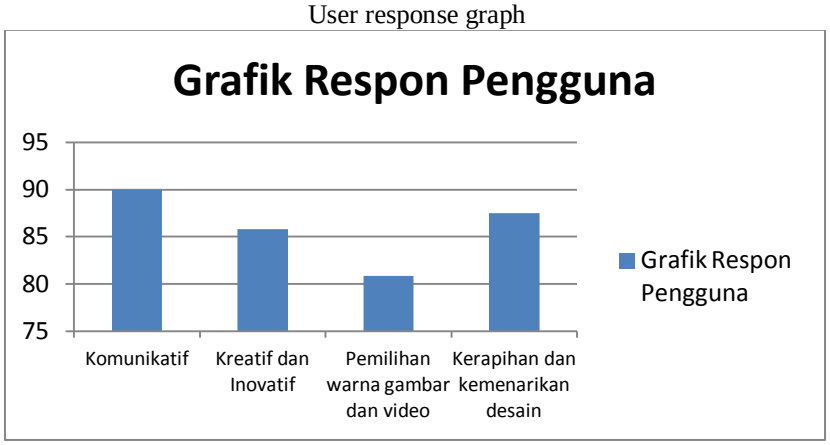



**User Response / Feedback**

User responses / responses to the product developed were carried out on 10 respondents consisting of 9 students of class XI MIPA 1 at SMA Tunas Mekar Indonesia and 1 teacher of chemistry subjects, the response / user responses of the researcher were carried out to determine the attractiveness and ease of respondents in using the learning model developed. The aspects assessed consist of 4 assessment indicators, namely communicative, creative and innovative, image color selection, neatness and attractiveness of the design. Recapitulation of questionnaire results from 10 respondents

Recapitulation user response product development Cooperative Learning Model *TGT* on communicative aspects of communicative percentage of respondents to the indicator amounted to 90 % with excellent predicate, the creative and innovative indicators scored 85.83 % with Predicate Good, the indicator color selection image gets value 80 , 83 % with a good predicate, for the indicators of neatness and attractiveness of the design got a score of 87.5 % with the predicate very good. The results of the recapitulation of respondents with an average value of 86.04 % with a very good predicate, it can be concluded that the development of the *TGT* Cooperative Learning Model to improve student learning outcomes carried out on the user response test is said to be very good for use in chemistry subject matter reaction rate. The table of user response results can be seen in the figure

User response graph




## IV. Discussion

The results of the analysis that has been carried out in this study indicate that the condition of the SMA TMI Bandar Lampung and the potential availability of facilities and infrastructure that support the development of the TGT ( *team games tornament)* cooperative learning model . SMA TMI Bandar Lampung has facilities and infrastructure such as a chemistry lab , complete textbooks that are able to facilitate this development activity. Supported by the ability of teachers and students on the day of observations that researchers have done, students and teachers have the potential to be used to develop the TGT cooperative learning model ( *team games tornament)* . .

The learning model is one of the factors that influence students in learning. The TGT type of cooperative learning model is one type of cooperative learning in which there are tournament activities that require students to compete with other students. The learning

does not seem monotonous and students are expected to be motivated to participate in lessons actively. TGT type of cooperative learning has stages that emphasize the game side with rewards at the end of the game .

The development of the TGT ( *team games tornament)* cooperative learning model is a cooperative learning model that is easy to apply, involving the activities of all students without having any status differences, involving the role of students as peer tutors and containing elements of play. The development of a learning model is able to present learning that is motivating, fun and improves student learning outcomes in schools. The TGT cooperative learning model approach is able to help students solve various learning difficulties and make learning more interactive.

The results of product feasibility testing by material experts consisted of three aspects, namely the content feasibility aspect consisting of 5 indicators, the presentation feasibility aspect there were 3 indicators and the contextual assessment aspect there were 2 indicators with a total average score of 3.46 with a description of the development product worthy of use. The product feasibility factor is considered feasible by material experts because the products developed are adjusted to core competencies and basic competencies and the products produced encourage students' curiosity in learning and the products developed can improve student learning outcomes.

In the results of feasibility testing by media experts carried out on aspects of content quality and objectives, aspects of technical quality and aspects of instructional quality which consists of 16 indicators scored an average value of 3.59 with a description of the development product suitable for use. The feasibility of testing media experts is very necessary because the media is a component in the environment of students that can stimulate students to learn (Gagne in Yusufhadi Miarso, 2004). Learning media are also used to transmit messages and can stimulate the thoughts, feelings, attention, and willingness of students so that they can encourage a deliberate, purposeful and controlled learning process (Miarso, 2004).

In the results of the feasibility test by design experts carried out on the aspects of writing text, words or language, design, coloring aspects, graphic aspects and audio visual aspects consisting of 11 indicators got an average score of 3.9 with a description of the development product worthy of use To measure whether the products developed can be used by the researchers conducted tests to see the response / feedback of users of the products developed, researchers took the data on the response of a product that was developped to 9 the students of class XI 1 and 1 chemistry teacher to assess whether the product which was developed to provide convenience and attractiveness of students in participating in learning with a percentage of 86.04% Very good criteria obtained from the questionnaire that the researcher has given to respondents, so it can be concluded that the development of the *TGT* cooperative learning model gets very good responses / responses by the user to be used. in chemistry learning on reaction rate material to improve student learning outcomes.

## IV. Conclusion

The results of the analysis of potential and problems that researchers have done at SMA TMI Bandar Lampung, especially in chemistry subjects on the subject of reaction rates, need to develop a cooperative learning model of TGT ( *team games tornament)* to improve student learning outcomes , this is also supported by the means and infrastructure contained in SMA TMI Bandar Lampung.

The process of developing the TGT ( *team games tornament)* cooperative learning model to improve student learning outcomes is developed with the *Borg and Gall Research and Development* (R&D) development model only up to 6 (six) stages, namely potential and problems, product design planning, product design making, expert validation, design improvement, final product after validation.

Learning Model K ooperatif *TGT* dikemba n g c an b erd a sarkan concepts, theories, principles and procedures of Educational Technology in managing effective learning that is easy to implement, involving the activities of all students without any distinction of status, involving the role of students as peer tutors and contains elements game

User responses to the developed product showed a percentage of 86 , 04 % with a very good predicate information. This shows that the product being developed can be used in chemistry learning in the reaction rate material

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