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Development and Implementation of Greater Learning Model Integrated Structured Tasks to Improve Student's Concepts Understanding

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Abstract

This research was conducted at the Chemistry Education Study Program, Faculty of Teacher Training and Education, Khairun University. This study aims to develop the GREATER-2T learning tool and its implementation to students' understanding of concepts in basic chemistry 1 course & teaching and learning strategies of chemistry. The population and sample in this study were all students of the chemistry education study program who programmed chemistry teaching and learning planning courses and chemical research methodology, odd semester of the 2021/2022 academic year. Sample selection using saturated sampling technique. The method used in this research is research and development (*research and development*). The products to be developed are learning tools in the form of lecture program units (SAP), learning implementation plans (RPP), and teaching materials. The development model used from Plom consists of 5 stages , namely: 1) initial investigation, (2) design, (3) realization/construction, (4) evaluation and revision, (5) implementation. The research instruments were in the form of validation sheets for learning tools and teaching materials, student response assessment sheets, and concept mastery assessment instruments. Data analysis used descriptive and inferential analysis, using SPSS application ..

Keywords : GREATER learning; structured assignments; mastery of concepts

1. Introduction

The Covid-19 pandemic that hit Indonesia and the world, practically made many activities unable to run normally or even stop, including in the field of education. The lack of sufficient knowledge about this virus makes many parties do not want to take risks to carry out activities as usual. In an effort to prevent the spread of the Covid-19 virus, the government through the circular letter of the Ministry of Education and Culture No. 40 of 2020, decided that learning activities are carried out without face-to-face directly between educators and students but are carried out online using the internet network.

This policy is also implemented, including at Khairun University, Ternate. Although online learning (online) offers varied and flexible media in terms of time and place, it turns out that this learning has certain weaknesses. In the implementation of online learning at Khairun University, especially in the Chemistry Education study program, several obstacles were found, including difficulty in being interactive, limitations in the application of digital technology, limited access to computer and smartphone devices, especially for students who live on islands with internet networks that are difficult to reach, prices for internet quota which is still relatively expensive, as well as interference that may be obtained from the learning environment at home. Facing this situation, lecturers are required to be able to design and design online learning that is light and effective, by utilizing devices or media as well as appropriate methods and in accordance with the material being taught.

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Mastery of concepts is the ability of students to understand concepts after learning activities. Students are said to master concepts if they are able to define concepts, identify and give examples or not examples of concepts, so that with this ability they can bring a concept in another form that is not the same as in a textbook (Arisanti, et al. 2016). Meanwhile, a more comprehensive definition of mastery of concepts is put forward by Bloom, namely the ability to capture meanings such as being able to express a material presented in a form that is more understandable, able to provide interpretation and be able to apply it. Mastery of concepts is the ability of students to understand the meaning scientifically, both in theory and in its application in everyday life. Furthermore, mastery of concepts is the ability of students not only to understand, but also to be able to apply the concepts given in solving a problem, even to understand new concepts (Astuti, 2017).

Online learning requires students as much as possible to build their knowledge and understanding of concepts independently. Increase reading references and reflections on what is found in life related to the material being taught. This step, can be obtained through GREATER learning (Gear Up, Read, Explore, Analyze, Tell, Elaborate, Reflection) whose implementation includes literacy and inquiry activities in learning. This model is also in line with constructivism learning theory and experiential learning which emphasizes the formation of knowledge independently by students with the help of their social environment in the form of scaffolding or gradual guidance and through reflection from their learning experiences (Fahmawati, 2018) **.** Integrated with structured tasks, namely methods that provide opportunities to study the material to be taught in advance , do exercises, carry out a discussion process in problem solving, and carry out deepening of the material or even conduct experiments on abstract material so that it can carry out activities that high, even with learning from home. This structured task learning is not the same as homework (PR). Structured assignments provide opportunities for students/students to complete the assigned tasks with various learning resources and by utilizing all available media which later the results of the work will be checked by the teacher/lecturer to determine the level of mastery of concepts and the correctness of students' answers. Wulyaningsih (2017) suggests that structured assignments can be given to students outside the learning process. The purpose of providing structured tasks is to support the implementation of intracurricular programs. The goal is also so that students can better live the learning materials they have learned and train students to carry out tasks responsibly. Thus, GREATER learning integrated with structured tasks can improve learning activities, it is also expected to be able to improve understanding of concepts and student learning outcomes.

2. Research methods

2.1. Place and time of research

All Research this conducted in University Khairun which located in city Ternate, North Ternate district

2.2. Type, Population and Research Sample

This research is an analytical research that uses descriptive analysis techniques, which describe the initial conditions of learning activities and experimental subjects in the chemistry study program at Khairun University. The population in this study were all students of the chemical education study program. Sampling used a purposive random sampling technique, where the samples used represented educational and non-educational subjects.

2.3. Data Collection and Processing

Data was collected through interviews, observation of learning activities, and data on evaluation of learning outcomes. Furthermore, the data is analyzed descriptively.

2.4 Research Methotd

The method used in this research is research and development (*research and development*). The products to be developed are learning tools in the form of lecture program units (SAP), learning implementation plans (RPP), and teaching materials. The development model used from Plom (Sugiono, 2016) consists of 5 stages , namely: 1) initial investigation, (2) design, (3) realization/construction, (4) evaluation and revision, (5) implementation. First, an analysis of the student's condition, the situation at school, and the things needed in the research were carried out. Next, formulate goals and then plan the manufacture of the product. The product developed is then tested for feasibility through the validation of experts, namely chemists and chemical education experts . After the media is declared valid, a product trial is carried out to determine the extent of the media's feasibility. The trials were carried out in the form of experimental research by design study *one group pretest-posttest design* . Where is the design this researcher To do measurement beginning, member treatment and final measurement. To see student responses, a questionnaire instrument was used. The test instrument is used to measure the contribution of GREATER-2T learning to students' mastery of concepts. The research flow can be seen in the figure 1.

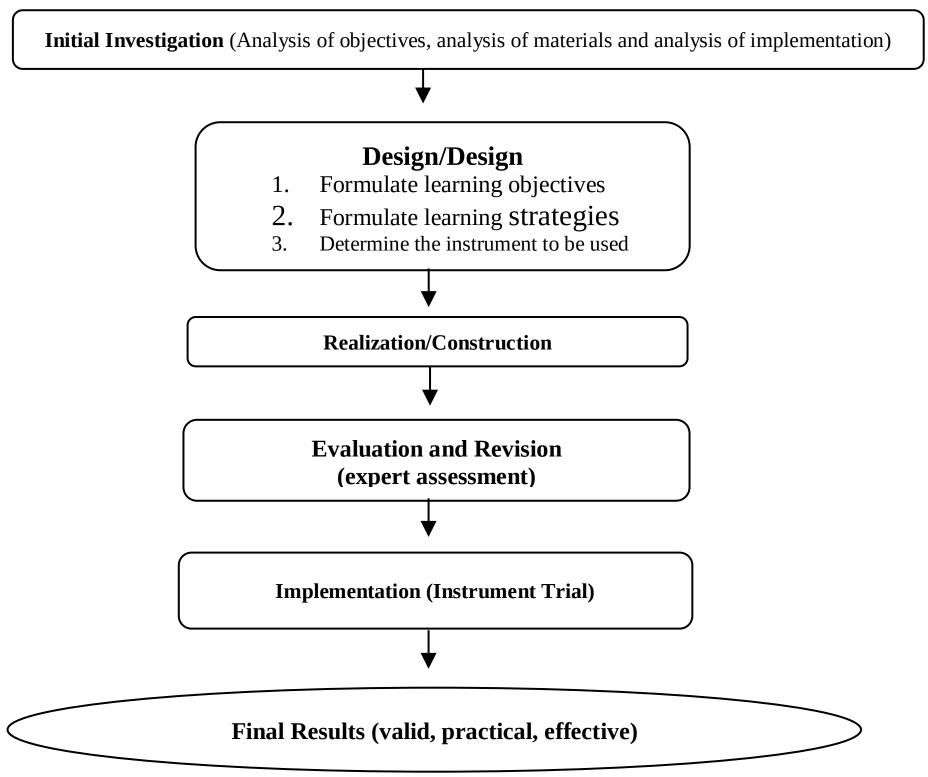

Figure 1: Design of the GREATER-2T . Learning Model Development Steps

3. Results and Discussion

3.1. Initial Investigation

The learning developed in this study is the GREATER-2T learning model using the Ploom development model, which consists of 5 main stages, namely: (1) initial investigation, (2) design, (3) realization/construction, (4) evaluation and revision. , (5) implementation. In accordance with these stages, the first step of this research is to define, what is meant in this case is to describe the initial conditions of the research subject. The data at this stage were obtained through interviews and direct observation/experience while teaching, and the results of the learning evaluation. Furthermore, the results of the data are described.

The curriculum applied to the Chemistry Education study program at Khairun University is based on the KKNI since 2016. The learning objectives refer to graduate learning outcomes (CPL) and subject learning outcomes. Based on open interviews with students who programmed learning strategies and basic chemistry 1 courses (representing educational and non-educational courses), information was obtained that they still had difficulty understanding the material provided. Some of the influencing factors include their low initial ability, lack of student interest in reading related materials other than those given in the learning process, difficulty in interacting during learning from home, inadequate updating and mastery of study spaces. Most students agree that they are given independent assignments online, but they also want hands-on learning which is considered more communicative and gives them more opportunities to discuss with friends or lecturers. Furthermore, based on observation and evaluation of learning outcomes, the following data were obtained:

Table 1. The results of the evaluation of learning Basic Chemistry 1 and Introduction to Education courses, Academic Year 2020/2021

Data Type	**Basic Chemistry I**	**Introduction to Education**
Amount of data	36	50
Minimum Value	55.00	37,50
Maximum Value	75.00	80.00
Average	54.94	67.77

Based on the table 1, it can be concluded that student learning outcomes are still lacking, the learning activities carried out must be communicative and include student needs, the tasks involved are not just filling students' free time, but must make it easier for them to understand the concepts being taught.

3.2. Design/Design Stage

The activities carried out at the product design stage are; a) formulate specific objectives, b) formulate evaluation tools, c) determine learning strategies, d) determine learning materials .

3.2.1. Formulate learning objectives

In formulating learning objectives, it must consider three learning domains, namely the *cognitive domain* which emphasizes the level of thinking; the affective domain which refers to attitudes and feelings and the psychomotor domain which emphasizes actions and skills. In addition, the learning objectives also consider the stratification of low-level thinking, medium-level thinking and high-level thinking.

3.2.2. Formulate evaluation tools to measure student concept understanding

The initial steps needed in compiling an evaluation tool or test are: identification of learning objectives, specifications or evaluation grids, and determining the form of the test to be used. In this study, the test was designed in the form of print and online tests.

3.2.3. Formulating learning strategies

Every activity process must have a goal direction to be achieved, as well as learning activities. Educators in this case teachers / lecturers are expected to have certain strategies in carrying out learning, so that goals can be achieved effectively and efficiently (Nadifah, 2018).

The delivery strategy used is a combination of face-to-face delivery and e-learning. The approach used is the approach recommended by the IQF curriculum, namely the scientific approach.

3.2.4. Learning device design

The result of the learning device design is to operationalize the components of the GREATER-2T learning model into the form of learning tools, in the form of: learning implementation plans, teaching materials, and evaluation tools. The format for each component of the learning device, namely:

a. The design of the learning implementation plan contains things that guide lecturers in learning both face-to-face learning and e-learning. Such as strategies, approaches, methods used, learning activities to be carried out, especially the learning phases, and assessment/evaluation tools to be used.
b. The design of teaching materials basically contains learning materials to be taught.
c. The design of the evaluation tool is in the form of a competency test for learning outcomes. In developing the test, several steps are needed, namely: identifying learning objectives, compiling a specification table or grid, determining the form of the test to be used and writing questions.

3.3. Realization/construction stage

Realization is carried out based on the results in the previous stage (initial investigation and design), then reflected and re-examined to be directed to the realization in the form of a prototype: (a) integrated GREATER model guidelines for structured tasks; and (b) learning tools; and (c) instruments.

3.3.1. Learning Media

The realization of the learning tools in question is in the form of a lesson plan (RPP) for teaching materials, and a competency test for learning outcomes. The lesson plan prepared is based on the GREATER-2T model syntax, which is then used as a guide in the implementation of learning Basic Chemistry 1 courses and Chemistry Teaching and Learning Strategies. The lesson plan consists of: (a) core competencies; (b) basic competencies; (c) indicators of achievement of basic competencies; (d) learning objectives; (e) learning materials; (f) learning scenarios; (g) learning strategies, approaches and methods; (h) learning tools and resources; (i) assessment tool.

Other supporting components in the realization of the GREATER-2T learning model are teaching materials and competency tests for learning outcomes. The material is prepared with the consideration that it can cover all the material that is the goal or target of learning, while the test is arranged to see how far the achievement of these goals.

3.3.2. Instrument

The research instrument was designed to be able to measure the validity and effectiveness of the GREATER-2T learning model and its supporting devices. Therefore, the realization of the instrument in question is; (1) GREATER-2T model validation sheet, (2) learning device validation sheet, (3) student response questionnaires to the implementation of learning, (4) instruments to assess learning outcomes.

3.4. Evaluation and Revision Stage

The learning model and its devices that have been designed are then validated by experts/experts. Expert validation was chosen for the reason of getting various criticisms and inputs in the process of developing learning models into products that are ready to be used. Validation was carried out by chemistry expert lecturers and chemistry education experts. The aspects that become the assessment of the GREATER-2T learning model are: syntax, social system, reaction principle, support system, and instructional impact and accompaniment. The results of research from experts are as table 2.

Table 2. GREATER-2T Model Validation Results

Rated aspect	Evaluation		Average	Criteria
	1	2		
Fill in the BLAVO model				
a. Syntax	4	3	3.5	Very Valid
b. Social System	3	3	3	Valid
c. Reaction principle	4	4	4	Very Valid
d. Support system	3	3	3	Valid
e. *Instructional* impact and accompaniment	3	4	3.5	Very Valid
Average			**3.4**	**Very Valid**

Validation was also carried out on learning tools which are supporting components of the GREATER-2T model, including syllabus, lesson plans, teaching materials, student response questionnaires, and concept understanding tests. This is done to ensure whether or not the device is used to assess the effectiveness of the GREATER-2T learning model when it is being tested. The assessment criteria include: learning objectives, content/objectives of materials/activities, language, construction, and time. Learning device validation activities are carried out by giving scripts (syllabus, lesson plans, teaching materials, response questionnaires, and concept understanding tests) along with validation sheets to the validator as many as 2 respondents. The validation results obtained are summarized as table 3.

Table 3. Results of Learning Device Validation

No	Rated aspect	Evaluation		Average	Criteria
		1	2		
1	Syllabus & RPP	3	4	3.5	Very Valid
2	Teaching materials	4	4	4	Very Valid
3	Student response questionnaire	4	3	3.5	Very Valid
4	Concept understanding test	3	4	3.5	Very Valid
Average				**3.63**	**Very Valid**

Based on the Table 3, it can be concluded that the GREATER-2T learning model and its devices are very valid and feasible to use (trial). The suggestions from the validator include the need for relevant supporting theories, adding reading literature/other media for the reading stage, and the duration of time in lesson plans and tests must be taken into account.

3.5 Implemetation

The learning model and its instruments that have been foundto be valid, are then tested on a limited basis in the sample class. The trial of the GREATER-2T learning model peda basic chemistry course 1 and introduction to education used experimental research with ***a one group pretest poostest*** research design**,** with a sampling technique by saturated sampling. The number of samples for the Basic Chemistry class 1 is 42 people, while for the introductory education class it is 45 people. The trial began with the provision of posttests, then the learning process with the GREATER-2T model, and to see the understanding of student concepts, a posttest was carried out. The results of the trial that showed an understanding of student concepts after the application of the GREATER-2T learning model were as follows:

3.5.1 Normality Test

Before conducting a hypothesis test, a normality test is first carried out on the research data. This normality test is an inferitional statistical prerequisite test that aims to see the normality of the distribution of the data obtained. The test used is the Kolmogorov-Smirnov test, with the test criteria: The study data is normally distributed when the significance value (Sig.) is greater than 0.05 In contrast, the study data did not distribute a normal significance value (Sig.) smaller than 0.05 The results of the normality test of the research data for samples in the Basic Chemistry 1 course are as follows in table 4.

Table 4. One-Sample Kolmogorov-Smirnov Test
(Pengantar Pendidikan)

		Unstandardized Residual
N		45
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	7.65400899
Most Extreme Differences	Absolute	.091
	Positive	.056
	Negative	-.091
Kolmogorov-Smirnov Z		.612
Asymp. Sig. (2-tailed)		.847

a. Test distribution is Normal.
b. Calculated from data.

Table 5. One-Sample Kolmogorov-Smirnov Test
(Kimia Dasar 1)

		Unstandardized Residual
N		42
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	9.14391804
Most Extreme Differences	Absolute	.088
	Positive	.071
	Negative	-.088
Kolmogorov-Smirnov Z		.587
Asymp. Sig. (2-tailed)		.881

a. Test distribution is Normal.

Based on the Table 4 and Table 5, it was found that the significance value of 0.881 > 0.05 in the Basic Chemistry course 1, and the significance value of 0.847 > 0.05 in the introductory education course. Then it can be concluded that the residual values in the two samples are normally distributed.

3.5.2 Hypothesis test

Test after the data obtained is declared normal, then a hypothesis test is then carried out, with the following results:

Table 6. Paired Samples Statistics
(Kimia Dasar 1)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test	62.0568	42	7.82751	1.18004
	Post Test	80.2727	42	10.33028	1.55735

Table 7. Paired Samples Statistics
(Pengantar Pendidikan)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test	54.067	45	11.7365	1.7496
	Post Test	76.378	45	8.4994	1.2670

Based on the Table 6 and Table 7, in the Basic Chemistry 1 course, an average pretest score of 54,067 was obtained, while for the average posttest score of 76,378. In the introductory education course, an average pretest score of 54,067 was obtained, while for the average posttest score of 76,378. From the average pretest and posttest scores of the two samples, it was found that the average score in Basic Chemistry 1 Pre Test was 62.0568 < Post test 80.2727, in the introduction to pre-test education 54.067 < Post test 76.378. Therefore, descriptively there is a difference in the average results between the Pre Test and the Post Test results (Table 8 and Table 9).

Table 8. Paired Samples Correlations
(Kimia Dasar 1)

		N	Correlation	Sig.
Pair 1	Pre Test & Post Test	42	.465	.001

Table 9. Paired Samples Correlations
(Pengantar Pendidikan)

		N	Correlation	Sig.
Pair 1	Pre Test & Post Test	45	.435	.003

In the Table 8 and Table 9, data related to the relationship between Pre Test and Post Test is presented. If the significance value is less than the probability of 0.05 then there is a relationship between the Pre test and the Post test. Meanwhile, if the significance value is more than the probability, there is no relationship between the pretest and the post test. Based on the results, it was found that the significance value of the Pre test-Posttest correlation in the basic chemistry course 1 was 0.001 < 0.05., and in the introductory education course 0.003 < 0.05. This means that there is a relationship between the pre-test and post-test values.

Next is the "Paired Samples Test", known sig value. (2-tailed) in basic chemistry course 1 is 0.000 < 0.05, similarly in introductory education course 0.000 < 0.05. So it can be concluded that there is an average difference between the results of learning Pre Test and Post Test which means that there is an influence on the use of the GRETER-2T learning model in increasing the understanding of student concepts for Basic Chemistry 1 and Introductory Education courses.

This result proves that learning with the GREATER model that integrates reading activities in it can improve cognitive abilities, meaning the ability to explain scientific facts, the ability to process science skills and scientific attitudes which are contextual applications. In line with this, Glynn and Muth (1994) in Fahmawati (2018), explained that to have science literacy, students must have the ability to read and write because reading and writing activities can be conceptual tools to help students in analyzing, interpreting and communicating scientific ideas. The positive influence of the application of the GREATER-2T learning model in the Basic Chemistry 1 1 and Introduction to Education courses, shows that this learning model can help students process the information or material provided so that it can improve their understanding of concepts. The GREATER-2T learning model first provides opportunities for students to study the material independently, design problem solving, then there are group activities to choose the right solution based on the results of the discussion. In the GREATER-2T learning model, there are writing and literacy activities, thus allowing the information received by students to be more enduring.

Integrated with structured tasks, making this GREATER learning model more planned, allowing for feedback and reinforcement, Mulyasa (2007) in Rahma (2008) stated that the method of giving learning assignments or resitation is a teaching method in the form of giving assignments by teachers / lecturers to students, and then students must be responsible for or report the results of the task. Assignments are structured online and offline, providing a different learning experience. In addition, the existence of assignments collected online provides convenience for lecturers and students in terms of assessment transparency, because the results can be checked directly.

4. Conclution

Based on the results of the study, it can be concluded that, the validity value of the structured task integrated GREATER learning model of 3.63 is in the very valid category. The results of the hypothesis test show that this learning model has a positive effect on students' mastery of concepts in basic chemistry courses and educational determinants.

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