JOSTEM
Journal of Strategy and Transformation in Educational Management

Vol 1(2).November 2023
https://jostem.professorline.com/index.php/jostem12345/about

Development Of Learning Devices Of Direct Teaching Model For Grade Vii Students On The Concept Of Quadrangles

Abstract

This study aims to produce a direct teaching model learning device for grade VII students on the concept of quadrilaterals. This study was conducted following the development stage of the 4-D learning model device from Thiagarajan . At the development stage , it was continued with the experimental stage which aimed to determine the effectiveness of the direct teaching model using the developed learning device, as well as to compare the learning outcomes of grade VII students on the concept of quadrilaterals taught with the direct teaching model compared to the learning outcomes of students taught with conventional learning. The learning devices developed were: (1) Learning Implementation Plan (RPP), (2) Student Worksheets (LKS), (3) Attitude and Performance Assessment Sheets, and (4) Learning Outcome Tests (THB). The results of the study showed that: (1) the direct teaching model learning device for grade VII students on the concept of quadrilaterals that was developed had met the criteria for a suitable learning device because it was declared valid by the validators, and at the trial stage, the teacher's ability to manage learning was categorized as good, student activities were categorized as effective, student responses were positive, and THB was valid, reliable and sensitive; (2) direct teaching model learning is effective for teaching the concept of quadrilaterals to grade VII students because 90% of students experienced learning completion, the teacher's ability to manage learning is categorized as good, student activities are categorized as effective, student responses are positive, and assessments of attitudes and performance are categorized as good; (3) the learning outcomes of grade VII students on the concept of quadrilaterals taught using direct teaching model learning are significantly better than the learning outcomes of students taught using conventional learning.

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Keywords: Development of direct teaching model, Learning device production, Quadrilateral concepts, Grade VII students).

1. Introduction

The progress of a nation is largely determined by the quality of its human resources. While the quality of human resources depends on the quality of education. The role of education is very important to create an intelligent, peaceful, open, and democratic society. Therefore, educational reform must always be carried out to improve the quality of education of a nation.

Education is essentially an effort to civilize humans or humanize humans. Education is very strategic to make the nation's life intelligent and is needed to improve the quality of the nation as a whole. Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual religious strength, self-control, personality, intelligence, noble morals, and skills needed by themselves, society, nation and state.

The function of mathematics in human life is so important that mathematics is an important subject for students. However, unfortunately, for most students, learning mathematics feels foreign, formal and only involves playing with numbers or symbols that are difficult and meaningless, and not a few even feel afraid to face mathematics lessons (Soedjadi, 2007:1).

Such student conditions indicate low motivation in learning mathematics, which ultimately has implications for low mathematics learning outcomes for students, so that in almost every school at the end of the school year, mathematics never shows the highest average score obtained by students.

The still low mathematics learning outcomes of students are shown by the results of the National Examination at the Junior High School level in Tana Toraja Regency which were announced by the South Sulawesi Provincial National Education Office in 2019 , mathematics lessons occupy the lowest position with details for Indonesian lessons with an average score of 5.78, English (6.38), mathematics (5.16), and science (6.37) (Source: http://www.tribun-timur.com=83789& type=Front).

One of the factors of educational success is the teacher factor. Teachers as one of the main implementers in the learning process are required to be able to take the initiative to determine the appropriate method according to the situation and condition of their students. Choosing the right method will cause the learning process to take place effectively according to the expected goals of the learning process.

Nowadays, many learning methods are developed, one of which is the expository learning method. The expository learning method is a learning method that is used by first providing information about the definition, principles and concepts of the subject matter and providing examples of problem-solving exercises in the form of lectures, demonstrations, questions and answers and assignments. Students follow the pattern set by the teacher carefully. The use of the expository method is a learning method that leads to the delivery of lesson content to students directly. There are 5 steps in implementing the expository method namely (1) preparation (2) presentation (3) correlation (4) concluding (5) applying (Ministry of National Education, 2008: 33) .

The expository method in this study was implemented with a direct teaching model . Direct teaching is a learning model that is centered on the teacher and is presented in 5 stages, namely (1) conveying learning objectives (2) demonstrating knowledge and skills (3) providing guided practice (4) checking understanding and providing feedback (5) providing further training and developing knowledge (Arends, 1997: 67).

The learning methods and models that will be implemented in the Classroom also need to pay attention to the suitability of the material to be taught. The selection of inappropriate learning methods and models can make students dislike or get bored with mathematics lessons, which in the end they will find it difficult to learn mathematics and affect their learning outcomes.

Based on the researcher's experience, student learning outcomes on the concept of quadrilaterals are relatively low. In the 2022/2023 academic year at MTs Negeri Gandang Batu, there were still 65% of students who did not complete the material. The average daily test score of 90 Class VII students on the concept of quadrilaterals only reached 55.71 . Given this, the author is interested in conducting a study entitled the development of direct teaching model learning

devices on the concept of quadrilaterals for Class VII students.

Research Questions

1. How is the process and results of developing good direct teaching model learning devices on the concept of quadrilaterals for Class VII students of Wahdah Islamiyah Makassar Middle School?
2. How effective is the direct teaching model in teaching the concept of quadrilaterals to Class VII students of Wahdah Islamiyah Makassar Middle School?
3. Are the learning outcomes of students taught using the direct teaching model better than the learning outcomes of students taught using the conventional learning model at SMP Wahdah Islamiyah Makassar on the concept of quadrilaterals in grade VII?

Term Limitations

To provide clear direction , it is necessary to provide terminological definitions. as follows:

1. Learning tools are a collection of learning resources used by teachers and students in carrying out learning activities in the classroom. The learning tools consist of Learning Implementation Plans (RPP), Student Worksheets (LKS) and learning outcome tests (THB) and assessment sheets that are arranged based on the direct teaching model.
2. The development of learning devices is an effort/process to obtain good learning devices and in accordance with the basis of a certain development theory. The development model used as a reference in this study is the Thiagarajan model (4- D model; Define, Design, Develop, Disseminate).
3. Good learning tools are learning tools that meet the characteristics of being valid, practical and effective.

a. Learning devices are said to be valid if: (1) The average validator's assessment of each device criterion is in the minimum good category. (2) The Learning Outcome Test (THB) meets the criteria of validity, reliability and sensitivity.

b. A learning device is said to be practical if: (1) The validator stated that the device can be used with minor revisions and the minimum assessment category is good (2) The device can be used by teachers. This is shown by the results of observations of teachers' abilities in managing learning, namely the average assessment of each aspect in each meeting has a minimum category of good. (3) The results of observations of student activities show that every aspect of student activity observed for each RPP is in the good or very good category.

c. Learning tools are said to be effective if: (1) Student responses to learning are positive, namely at least 80% of students give a positive response (2) Learning Outcome Tests (THB) achieve classical learning completion, namely at least 80% of students get a score ≥ KKM value.

4. Learning effectiveness is the success of learning based on 4 established aspects, namely: student learning completion in a classical manner, teacher ability to manage learning at least well, student activities in learning meet the ideal time tolerance criteria set, positive student responses to learning tools and learning activities.
5. Student learning outcomes are the scores that students have obtained after completing a learning outcome test (posttest) for a particular competency.
6. The direct teaching model is a learning model that has five stages, namely (1) delivering learning objectives (2) demonstrating knowledge and skills (3) providing guided practice (4) checking understanding and providing feedback (5) providing further training and application (Arends, 1997: 67).
7. Conventional learning is learning that is usually carried out by teachers in schools, namely centered on the teacher and students are only passive recipients , learning activities begin with the teacher explaining a material concept accompanied by providing examples of questions whose solutions are also provided by the teacher, continued by providing practice questions to students to be worked on individually, and finally the teacher gives questions to be worked on at home.
8. The concept of a quadrilateral is a teaching material taught in Class VII MTs. Flat-sided spatial structures consist of squares and rectangles. The flat-sided spatial structures discussed in

this study are cubes and cuboids with several indicators, namely mentioning the elements of cubes and cuboids, finding and calculating the volume and surface area of cubes and cuboids.

Literature Review

The direct teaching model is a learning model designed to support students' learning processes related to well-structured declarative knowledge and procedural knowledge that can be taught with a gradual, step-by-step activity pattern (Arends, 1997).

The direct teaching model has the following characteristics:

1. The existence of learning objectives and the influence of models on students including learning outcome assessment procedures.
2. The overall syntax or pattern and flow of learning activities.
3. The management system and learning environment model are needed so that certain learning activities can take place successfully (Nur, 2008: 3)

Direct teaching can be in the form of lectures, demonstrations, training or practice and group work. In the direct teaching model there are five important phases. Nur (2008 : 36) describes 5 phases in the syntax of the teaching model , namely phase 1 conveying goals and motivating students , phase 2 present declarative and procedural knowledge or demonstrate skills, Phase 3 provides guided practice , phase 4 checks understanding and provides feedback , phase 5 provides follow - up practice and application .

Conventional learning is learning that is usually done by teachers in schools, namely centered on the teacher. Teachers transfer knowledge to students, while students are more passive recipients. Learning activities carried out by teachers are routine activities that start from providing theory, then example questions and ending with practice questions or homework. This is as stated by Hudojo (1988: 127) that the mathematics learning that is the habit of teachers is learning that presents the following sequence: (1) definitions and formulas are given, (2) examples are given, and (3) practice questions are given.

Arends (2001: 18) explains effective learning as follows: Effective learning requires teachers who are academically capable, able to process teaching materials, and who care about the lives of children and adolescents. Effective learning also requires someone who is able to produce students who are academically and socially successful. These characters are prerequisites for teaching. However, these prerequisites are not enough without the following four attributes: (1) effective teachers have personal qualities that are able to develop good relationships and communication with students, parents of students, and colleagues, and are able to create a democratic and socially just classroom atmosphere; (2) effective teachers have a positive view of knowledge and are able to process at least three basic knowledge, namely: teaching materials, human development and learning, and pedagogy as a guide in teaching; (3) effective teachers are able to process a list of songs when learning takes place to stimulate student learning motivation, to increase the achievement of basic skills, to develop a higher level of thinking, and to produce independent learners; (4) Effective teachers personally manage the process of reflection and problem solving, realize that learning to teach is an eternal process, and diagnose situations, then adapt, and use their appropriate professional knowledge to encourage students to learn and improve the quality of the school.

Learning outcomes according to Sudjana (2009:22) are the abilities possessed by students after receiving their learning experiences which are essentially changes in behavior, as a result of the learning process. Howard Kingsley (in Sudjana, 2009:22) divides three types of learning outcomes, namely: (1) skills and habits, (2) knowledge and understanding, and (3) attitudes and ideals. Each type of learning outcome can be filled with materials that have been set in the curriculum. Gagne divides five categories of learning outcomes, namely: (1) verbal information, (2) intellectual skills, (3) cognitive strategies, (4) attitudes and (5) motor skills. Meanwhile, Benjamin Bloom divides three categories of learning outcomes, namely: (1) cognitive, (2) affective and (3) psychomotor.

In this study, learning devices are said to be suitable or of good quality if they have been declared valid by the validator and in the application of these devices the following results are

obtained: (1) teacher ability in managing learning is categorized as at least good, (2) student activity in learning is categorized as effective, (3) student response to learning is positive, and (4) learning outcome tests meet the criteria of validity, reliability and sensitivity .

The development of learning devices conducted in this study refers to the development model of Thiagarajan et al. (Thiagarajan, Semmel and Semmel, 1974:5) which is also known as the 4-D Model (Four-D Model). This model consists of four stages, namely defining, designing, developing and disseminating.

According to the 2013 Curriculum, the concept of quadrilaterals is taught to students in grade VII of junior high school/Islamic junior high school in semester 2. The expected competency standards for the concept of quadrilaterals are that students understand and can use the properties and elements of flat-sided geometric shapes in problem solving. Indicators of the success of the concept of quadrilaterals are recognizing and mentioning the elements of squares and rectangles, finding and calculating the surface area of squares and rectangles.

The concept of a quadrilateral consists of several sub-chapters, namely squares and rectangles. The material in this study focuses on cubes and cuboids that contain declarative and procedural knowledge. In this study, students are expected to be able to recognize and mention the elements of cubes and cuboids, find and calculate the surface area of cubes and cuboids.

2. Materials and Methods

Types and Procedures of Research

Based on the research objectives, this research can be classified as a type of development research. Because in this research, the researcher wants to develop a learning device on the concept of a quadrilateral with a direct teaching model, in addition the researcher also wants to know the effectiveness of the direct teaching model on the concept of a quadrilateral using the learning device that has been developed as well as to compare the learning outcomes of grade VII students on the concept of a quadrilateral taught with a direct teaching model compared to the learning outcomes of students taught with conventional learning on the same topic. The learning devices developed are in the form of a Learning Implementation Plan (RPP), Student Worksheets (LKS), Attitude and Performance Assessment Sheets, and Learning Outcome Tests (THB). While the research instruments developed are validation sheets for learning devices, student activity observation sheets, teacher ability observation sheets in managing learning, and student response questionnaires both to learning devices and to the direct teaching model used.

This research began with the development of a direct teaching model learning device for grade VII students on the concept of quadrilaterals. Then it was continued with an experiment to compare the learning outcomes of grade VII students on the concept of quadrilaterals taught using the direct teaching model compared to the learning outcomes of grade VII students on the concept of quadrilaterals taught using conventional learning.

Subject and Time of Research

In the trial stage of the learning device, the subjects of the trial were students of class VII A of SMP Wahdah Islamiyah Makassar. And in the experimental stage, the subjects of the study were students of class VII B of SMP Wahdah Islamiyah Makassar as the control class, and students of class VII C of Wahdah Islamiyah Makassar as the experimental class. The two classes were selected randomly using the simple random sampling technique . This research was conducted in the even semester of the 2022/2023 academic year.

Learning Device Development Procedures

In this study, the device development model used refers to the 4-D device development model proposed by Thiagarajan, Semmel and Semmel (1974). This model consists of four stages, namely define , design , develop , and disseminate . The 4-D model used in this study will be slightly modified. The modifications that will be made by the researcher are as follows.

1. Concept analysis and task analysis are not carried out simultaneously, but concept analysis and task analysis are carried out sequentially. Before the trial stage of the learning device, a

simulation and readability test are first carried out so that the device being tested is easier to understand, both by students and partner teachers. The dissemination stage is carried out on a limited basis, namely only in the experimental class, which in this case is class VII C of SMP Wahdah Islamiyah Makassar.

After the development stage and the production of a feasible direct teaching model learning device, an experiment was then conducted to compare the learning outcomes of grade VII students on the concept of quadrilaterals taught using the direct teaching model compared to the learning outcomes of grade VII students on the concept of quadrilaterals taught using conventional learning.

Experimental Design

The experimental design used in the experimental stage is a two group pretest-post test design as shown in the following table.

	Group	***Pretest***	**Treatment**	***Post test***
R)	Experiment	T_{1E}	X	T_{2E}
R)	Control	T_{1K}	Y	T_{2K}

Information:

T 1E = Pretest value of experimental group
T 1K = Pretest value of control group
T 2E = Post-test value of the experimental group
T 2K = Post-test value of control group
X X = Implementation of direct teaching learning model
Y = Implementation of conventional learning

The experimental class will be given direct teaching model learning while the control class will be given conventional learning. In learning, students in the experimental class are divided into small groups with 5-6 members, and each group has heterogeneous members (consisting of smart, average, and less smart students). This grouping takes into account input from partner teachers and the mathematics scores that students have obtained in previous materials.

Experimental Hypothesis

The hypothesis to be tested in this experiment is "the learning outcomes of grade VII students on the concept of quadrilaterals taught using direct teaching model learning are better than the learning outcomes of grade VII students on the concept of quadrilaterals taught using conventional learning".

Experimental Data Analysis

To compare the learning outcomes of grade VII students on the concept of quadrilaterals taught with direct teaching model learning and the learning outcomes of students taught with conventional learning as well as to answer the third sub-research question, the difference in pretest and posttest data from the control class and the experimental class at the experimental stage will be analyzed using inferential statistics of the two-mean test. The steps for the two-mean test in this study are as follows.

a. Data Normality Test

To test the normality of the data in this study, the Kolmogorov-Smirnov test was used in the SPSS 2.0 program. with the provision that the data is normally distributed if Sig> α is obtained, with α being the level of significance. In this study, the α level of 5% was used because this study

can be classified as social research where there are many variables that influence but cannot be controlled.

b. Calculating Sample Variance

To calculate the variance of a data sample, use the following formula.

$$S^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$$ (Sudjana, 1996: 206)

Information:

n=amount of data

x i = i-th data, i = 1,2,3,...

x̄ = mean of the data

c. Test of Equality of Variance

Because in this study the variance of the two populations, namely the control class and the experimental class, is unknown, to find out whether the two are the same or not, a variance equality test is used, namely the F-test to test the following statistical hypothesis.

H 0 : σ 1 2 = σ 2 2 (population variance is the same)

H 1 : σ 1 2 ≠ σ 2 2 (population variances are not the same)

The criterion for rejecting H 0 with a significance level of α is if the calculated F is greater than the F table (Sudjana, 1996: 250). Rejecting H 0 means that the variances of the two populations are not the same.

d. Mean Equality Test

To test the equality of means between two samples, a distinction is made between those with equal variances and those with unequal variances.

1) Test of Equality of Means with Equal Variances

The test of equality of means for the same variance uses the t-test, where the t table uses degrees of freedom v = n 1 +n 2 –2, namely t table = t α,v ,

2) Test of Equality of Means with Unequal Variances

The test for equality of means for unequal variances uses the t-test, where the calculated t is found using the formula:

While t table = t α , γ determined by the degrees of freedom γ which is found using the formula:

$$t' = \frac{(\bar{x}_1 - \bar{x}_2) - \mu_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

$$\gamma = \frac{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)^2}{\frac{\left(\frac{S_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{S_2^2}{n_2}\right)^2}{n_2 - 1}}$$

information

n 1 , n 2 = number of samples of the control class and experimental class

S 1 2 , S 2 2 = variance of control class and experimental class

γ = degrees of freedom of the t distribution

x̄ 1 , x̄ 2 = average value of control class and experimental class

μ 0 = expected initial mean (if no expected initial mean is specified, then μ 0 = 0)

The test of equality of means (t-test) above is used to test the following statistical hypothesis:
H 0 : μ 1 = μ 2
(the average of both classes is the same)
H 1 : μ 1 <μ 2
(the average of the experimental class is better than the control class)
Information:
μ 1 = mean of control class
μ 2 = average of experimental class
The research hypothesis is in H1
Using the left-hand test

By using the left-tailed test, if the calculated t value < – t table , then H0 is rejected and H1 is accepted, which means that the average of the experimental class is better than the control class. Thus, it can be concluded that the learning outcomes of students in the experimental class on the concept of quadrilaterals taught using direct teaching model learning are significantly better than the learning outcomes of the control class taught with conventional learning.

If the experimental data analysis concludes that the learning outcomes of students in the experimental class (using direct teaching model learning) are not better than those in the control class (using conventional learning), then it becomes a consideration for researchers to repeat the stages of developing learning devices starting from the definition stage (define), design , or development (develop). To determine which stage should be repeated is by analyzing the results of students' answers on the learning outcome test and looking for weaknesses or deficiencies of students that can lead to each stage of definition (define), design , or development (develop).

3. Results

Define Stage

Early-late analysis

So far, the mathematics learning process in class VII of SMP Wahdah Islamiyah Makassar tends to use conventional learning methods where learning is in the form of transferring knowledge and the role of the teacher is very dominant.

Student Analysis

Information obtained through several sources found the following things:

The majority of students at Wahdah Islamiyah Makassar Middle School can communicate well in Indonesian , although they use Toraja language when interacting with their friends.

They have learned about the shape and properties of quadrilaterals. So the shape and properties of these quadrilaterals are no longer foreign to students. This is certainly a good initial skill for students to learn the concept of quadrilaterals.

Material Analysis

The results of the analysis of the material for cubes and blocks taught can be seen as follows.

1) Facts
a) Definition of side, edge, corner point, side diagonal, space diagonal and diagonal plane
b) Definition of cube and cuboid
2) Concept
a) Cube
b) Block
3) Principles
a) Surface area of a cube = 6 x s 2
b) Surface area of the block =
2 (pi + pt + lt)

c) Volume of cube = s 3
d) Volume of cuboid = px / xt
4) Procedure
a) Mention the sides, edges, corner points, side diagonals, space diagonals and diagonal planes.
b) Calculating the surface area of cubes and cuboids
c) Calculating the volume of cubes and cuboids
d) Solve problems related to elements, surface areas and volumes of cubes and blocks

Task Analysis

In this task analysis, the tasks carried out by students in learning will be identified. Based on the analysis of the material above, a series of tasks can be identified in learning cube and block material. The main skills that students are expected to have are solving problems related to the elements, surface area and volume of cubes and cuboids.

Learning Objectives Specification

Based on material analysis and task analysis, more specific learning objectives are as follows.

1) Students can identify the elements of cubes and cuboids.
2) Students can determine the surface area of a cube
3) Students can calculate the surface area of a cuboid
4) Students can determine the volume of a cube
5) Students can calculate the volume of a cuboid

Design Stage

Media Selection

From the results of this media selection, it was determined that the learning media needed in the implementation of direct learning are learning devices that include: Learning Implementation Plan (RPP), Student Worksheets (LKS), and Assessment Sheets. While the learning aids needed include: whiteboards, markers, erasers, notebooks, pens, and cube and block-shaped boxes.

Format Selection

The format of the learning implementation plan (RPP) and student worksheets (LKS) used is adjusted to the format of the Learning Implementation Plan in the 2013 curriculum as well as the steps in direct learning.

Initial Design

At this stage, an initial design is produced in the form of a Learning Implementation Plan (RPP), Student Worksheets and Assessment Sheet. At this stage an observation sheet is also produced teacher's ability to manage learning 1 sheet, student activity observation sheet 1 sheet and student response questionnaire sheet 1 sheet. All results at this design stage are called drafts .

Development Stage (Develop)

Expert validation results

Results of Validator's General Assessment of Learning Tools

No	Devices Rated	Validator Given Values				Category
		1	2	3	Average	
1	Learning Implementation Plan (RPP)	3.00	3.60	3.00	3.20	Valid
2	Student Worksheet	3.00	3.40	3.30	3.23	Valid

	(LKS) Assessment Sheet					
3	a. Learning Outcome Test	3.00	3.50	3.50	3.33	Valid
	b. Attitude Assessment Sheet	3.00	3.40	3.60	3.33	Valid
	c.Performance Assessment Sheet	3.00	4.00	3.50	3.50	Valid

Readability Test

The revised learning device after receiving input from the validators, then underwent a readability test. This readability test was carried out by giving Draft II, namely LKS, to 6 students who had low, medium, and high academic abilities with two people each. In this readability test, students were asked to underline words or sentences that were not understood.

Trials

The revised learning device based on the results of expert validation and readability test, was then tested on class VII A of SMP Wahdah Islamiyah Makassar in the 2014/2015 academic year totaling 38 students. In accordance with the research plan, the trial was carried out 3 times in accordance with the RPP which began with an initial test (pretest) and ended with a final test (posttest).

Feasibility analysis of trial class

The recapitulation of the achievement of the eligibility criteria for the direct teaching model learning device on the concept of quadrilaterals is shown in the following table.

No	Category Aspects	Information
1	Classical learning completion	Achieved
2	Teachers' ability to manage learning	Good
3	Student activities	Effective
4	Student response	Positive
5	Assessment of attitudes and skills	Good

From the table above, it appears that all the criteria for the eligibility of learning devices have been met, so it can be concluded that the answer to the first sub-question of the research question is that the learning device of the direct teaching model on the concept of quadrilaterals for grade VII students that has been developed meets the criteria for a feasible learning device and can be used for the experimental stage.

Effectiveness of Direct Teaching Model Learning

recapitulation of the achievement of the criteria for the effectiveness of direct learning in class VII on the concept of quadrilaterals using direct teaching model learning devices that have been produced in the device development process is as follows.

No	Category Aspects	Information
1	Expert validation	Valid
2	Teachers' ability to manage learning	Good
3	Student activities	Effective
4	Student response	Positive
5	Learning outcome test	Valid, reliable and sensitive

Based on Table above, it appears that all the criteria for learning effectiveness have been met, so it can be concluded that the answer to the second sub-question of the research question has met the criteria for effective learning.

Inferential Analysis related to Student Learning Outcomes

Data Normality Test

Kolmogorov-Smirnov Test Results for Experimental and Control Class Data

Tests of Normality

	Kolmogorov-Smirnov [a]			Shapiro Wilk		
	Statistics	Df	Sig.	Statistics	df	Sig.
Experimental_Class	.106	37	.200 *	.981	37	.754

*. This is a lower bound of the true significance.

Tests of Normality

	Kolmogorov-Smirnov [a]			Shapiro Wilk		
	Statistics	Df	Sig.	Statistics	df	Sig.
Control_Class	.081	37	.200 *	.976	37	.604

*. This is a lower bound of the true significance.

No	Description	Control Class	Experimental Class
1.	Lots of data	37	37
2.	Average	52.48	63.41

3.	Variance	245.95	207.58
4.	Standard deviation	15.68	14.40

Based on the table above, the significance value (sig) for data from the experimental class and the control class is the same, namely 0.200. This significance value is greater than the α value that has been set, namely 5% or 0.05. Thus, it can be concluded that the data obtained
from the experimental class and the control class are normally distributed data.

Test of Equality of Variance

Data on the Difference between Pretest and Posttest of Control Class and Experimental Class

Furthermore, because in this study the variance of the two populations, namely the control class and
the experimental class, is unknown, a variance equality test was conducted using the F-test to test the following statistical hypothesis.

H 0 : σ 1 2 = σ 2 2 (Population variance is the same)
H 1 : σ 1 2 ≠ σ 2 2 (Population variances are not the same)

Based on the data in the Table and with a significance level of α = 0.05, the calculated F = 1.185 is
obtained by dividing the variance value of the control class by the variance value of the experimental class, while the F table = F α (31-1, 37-1) = F 0.05 (36, 36) = 1.69. Thus, the calculated F < F table , so that H 0 is accepted and H 1 is rejected, which means that the variance of the two populations is the same.

Mean Equality Test

After conducting the variance equality test, it is concluded that both population variances are the same, then a test of equality of two means with the same population variance is carried out. The combined variance S p = 226.76 is obtained and is used in the t-test to test the following statistical hypothesis.

H 0 : μ 1 = μ 2
(the average of both classes is the same)
H 1 : μ 1 < μ 2
(the average of the experimental class is better than the control class)
Information:
μ 1 = mean of control class
μ 2 = average of experimental class
The research hypothesis is in H1
Using the left-hand test

With a significance level of α = 0.05, the value of t count = - 3.065 and t table = t 0.05;72 = 1.671 is obtained. By using the left-sided statistical test and because t count < - t table , then H 0 is rejected and H 1 is accepted, which means that the average value of the experimental class is significantly better than the average value of the control class.

4. Conclusions

1. The learning tools of the direct teaching model include RPP, LKS, Assessment sheets and THB for grade VII students on the concept of quadrilaterals and developed with the 4D Thiagarajan model which have met the eligibility criteria, namely:
a. Learning devices are declared valid by validators.

b. The teacher's ability to manage learning is categorized as good.
c. Student activities in learning are categorized as effective
d. Student responses are in the positive category
e. Valid, reliable and sensitive learning outcome tests
2.Learning with a direct teaching model on the concept of quadrilaterals using the developed learning tools has met the criteria for effective learning, namely:
a. Achieving classical learning completion
b. The teacher's ability to manage learning is categorized as good.
c. Student activities in learning are categorized as effective
d. Student responses are in the positive category
e. Assessment of attitudes and skills is categorized as good
3. The learning outcomes of class VII students on the concept of quadrilaterals taught using the direct teaching model are significantly better than the learning outcomes of students taught using conventional learning.

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