Applying Tangram Modules on Geometry

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Abstract

Research in mathematics education has long proven that the difficulty of learning mathematics becomes an important problem for students at all levels.The process of learning mathematics does not encourage students to think mathematics.Students directly use the formula without being taught how to analyze and apply it in everyday life.Understanding concepts is an important foundation for thinking mathematics in solving everyday problems.Students can show an understanding of mathematical concepts that have been learned, explain the interrelationships between concepts, and apply concepts flexibly, accurately, efficiently, and precisely in problem solving.Therefore, the researcher wants to know the effectiveness of the application of tangram modules on geometry in class IV SDI Surya Buana Malang City.

Researchers conducted two trials, namely initial trials and field trials.The test is carried out by comparing the experimental class and the control class. Data collection instruments used were questionnaires, interviews, observation sheets, and learning outcomes. Data analysis was used to see the effectiveness of the tangram module, the researcher used a description test. Assessment refers to the scoring formula that is commonly done in schools.

Tangram module on geometry can effectively improve the learning outcomes of IVC graders at SDI Surya Buana Malang. The average control class was smaller than the experimental class at the posttest, 73 <91. The students' responses were also very positive towards the tangram module on three aspects: ease, attractiveness, and usefulness. All students stated that this teaching material was very useful in learning.

Keywords : *Tangram Modul; Geometry*

Abstrak

Penelitian dalam pendidikan matematika sudah lama membuktikan bahwa kesulitan pembelajaran matematika menjadi masalah penting pada siswa di semua tingkatan. Proses pembelajaran matematika selama ini kurang mendorong siswa dalam berpikir matematika. Siswa secara langsung menggunakan rumus tanpa diajarkan cara menganalisis dan penerapnnya dalam kehidupan sehari-hari. Pemahaman konsep merupakan landasan penting untuk berpikir dalam menyelesaikan permasalahan matematika maupun

permasalahan sehari-hari. Siswa dapat menunjukkan pemahaman konsep matematika yang dipelajarinya, menjelaskan keterkaitan antar konsep, dan mengaplikasikan konsep secara luwes, akurat, efisien, dan tepat dalam pemecahan masalah.Oleh karena itu, peneliti ingin mengetahui keefektifan penerapan modul tangram pada geomteri pada siswa kelas IV SDI Surya Buana Kota Malang.

Pada penelitian ini uji coba dilakukan sebanyak dua kali yaitu uji coba awal dan uji lapangan.Pengujian ini dilakukan dengan membandingkan kelas eksperimen dan kelas kontrol. Instrumen pengumpulan data yang digunakan peneliti untuk mendukung penelitian diantaranya adalah angket, wawancara, lembar pengamatan, dan tes hasil belajar.Analisisdatahasiltes belajar digunakanuntukmelihat keefektifanmodul tangram, peneliti menggunakan tes berbentuk uraian. Penilaian mengacu pada rumus penskoran yang biasa dilakukan di sekolah yang diteliti.

Modul tangram materi geometri secara efektif dapat meningkatkan hasil belajar siswa kelas IVC di SDI Surya Buana Kota Malang. Rata-rata kelas kontrol lebih kecil dibanding kelas eksperimen pada soal posttest yaitu 73 < 91. Respon siswa juga sangat positif terhadap produk modul tangram yang dilihat dari tiga aspek yaitu kemudahan, kemenarikan, dan kemanfaatan. Seluruh siswa menyatakan bahwa modul ini sangat bermanfaat dalam pembelajaran.

Kata Kunci:*Modul Tangram; Geometri*

A. INTRODUCTION

Research in mathematics education has long proven that the difficulty of learning mathematics becomes an important problem for students at all levels.Some common problems in learning mathematics include: (1) difficulty memorizing basic numbers; (2) weakness of arithmetical operations; (3) confusion in writing symbol notation; (4) poor understanding of concepts.[1] The process of learning mathematics does not encourage students to think mathematics. Students directly use the formula without being taught how to analyze and apply it in everyday life. The main principle in learning mathematics is to improve and prepare learning activities that benefit students who aim to move from teaching mathematics to learning mathematics.[2] Understanding concepts is an important foundation for thinking in solving everyday problems.[3] Students can show an understanding of mathematical concepts that have been learned, explain the

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[1]Aikaterini Katmada, Apostolos Mavridis, dan Thrasyvoulos Tsiatsos, "Implementing A Game for Supporting Learning in Mathematics.," *Electronic Journal of e-Learning* 12, no. 3 (2014): 230.

[2] Nila Kesumawati, "Pemahaman Konsep Matematik dalam Pembelajaran Matematika", *Semnas Matematika dan Pendidikan Matematika 2008,* Vol 2, hlm. 230

[3] National Council of Teachers of Mathematics. *Principles and Standards for School Mathematics* (Reston, VA: NCTM, 2000) hlm. 20

interrelationships between concepts, and apply concepts flexibly, accurately, efficiently, and precisely in problem solving.[4]

According to the National Council of Teaching of Mathematics (NCTM) to achieve meaningful understanding, mathematics learning must be directed at developing the ability of mathematical connections between various ideas, understanding mathematical ideas interrelated with each other. it builds a holistic understanding, and uses mathematics in contexts outside mathematics.[5]

Research findings and interviews with Shellya Khabib Dirgantari, IVC teacher at SDI Surya Buana, said that students experienced difficulties in terms of area and perimeter. The teacher also said that student learning outcomes on and perimeter material decreased due to several factors, one of which was difficult to understand the concepts of and perimeter.[6]A decrease in student learning outcomes indicates that students lack understanding of the material.

Researchers have observed books and media used by teachers and students. Books published by the government have very little explanation about geometry. The teacher also mentioned that they felt difficulties when teaching students of geometry. Because books from the government are only questions without material and there is no media that makes it easy for students to understand geometry. In government books there are instructions for making tangram media but they are only used briefly and are not related to mathematics.

The use of tangram media is very beneficial for students, among others: improving mathematics learning achievement (Dewi Kristanti[7], Hanggana Raras Nurtasari[8], Alaris Berutu[9], Meisa Dwi Anjarsari[10]); understanding the concept of geometry;[11]reduce misconceptions;[12]increase student motivation and creativity.[13]

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[4] Depdiknas. *Pedoman Khusus Pengembangan Sistem Penilaian Berbasis Kompetensi SMP* (Jakarta: Depdiknas, 2003) hlm. 2.

[5] National Council of Teachers of Mathematics. *Principles and Standards for School Mathematics* (Reston, VA: NCTM, 2000) hlm. 50.

[6] Shellya Khabib Dirgantari, wawancara (Malang, 4 Februari 2017)

[7] Dewi Kristanti, "Upaya Meningkatkan Prestasi Belajar Matematika Materi Bangun Datar Melalui Media Tangram Pada Siswa Kelas VII SMP Negeri 25 Surabaya". *E-Jurnal Dinas Pendidikan Kota Surabaya*; Volume 4, hlm. 1.

[8] Hanggana Raras Nurtasari,"Pengembangan Lembar Kegiatan Siswa (LKS) dengan Media Tangram Pada Pembelajaran Matematika Materi Jajargenjang dan Belahketupat". *Jurnal Ilmiah Pendidikan Matematika* Volume 3 No. 5 Tahun 2016, hlm. 1

[9] Alaris Berutu, *Penerapan Metode…*, hlm. 9

[10] Meisa Dwi Anjarsari, "Meningkatkan Hasil Belajar Materi Mengidentifikasi Sifat-Sifat Bangun Datar Menggunakan Media Tangram Di Sekolah Dasar". *JPGSD* Volume 01 Nomor 02 Tahun 2013, 0-216, hlm 1.

[11] Shofan Fiangga, "Tangram Game Activities, Helping The Students Difficulty In Understanding The Concept of Area Conservation Paper Title", *Proceeding of International Conference On Research, Implemention And Education of Mathematics And Sciences 2014*, Yogyakarta State University, 18-20 May 2014, hlm 1.

Based on the problems, modules are needed to understand the concepts of geometry to students. Therefore, researchers want to know the effectiveness of the use of tangram modules in geometry in class IV SDI Surya Buana Malang City.

B. METHOD

In this study, researchers conducted trials twice, namely initial trials and field trials. The research sample was experimental class students namely IVC class SDI Surya Buana Malang. This test is done by comparing the experimental class and the control class.[14]Class IVC as an experimental class that gets treatments from the teacher is using the tangram geometry module. While IVB class students as the control class did not receive treatment from the teacher and made a comparison. The experimental model of the type of control experiment can be illustrated in table 1.

Tabel 1 Control Experiment

Group	Pre test	Treatment	Post test
Eksperiment	O_1	X_1	O_2
Control	O_3	X_2	O_4

Table Descriptions:
X1: learning to use the tangram module
X2: learning without using the tangram module
O1: pre-test experimental group
O2: post test experimental group
O3: pre-test control group
O4: post test control group

Based on the types of data that have been presented, in this study there are several data collection instruments needed by researchers to support research including questionnaires, interviews, observation sheets, and learning outcomes.

Data analysis is used to see the effectiveness of the tangram module. Researchers use the description test. Assessment refers to the scoring formula that is commonly done in schools.

1) Assumption Test for Initial Data Analysis

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[12] Anisatul Farida, "Analisis Miskonsepsi Siswa Terhadap Simbol Dan Istilah Matematika Pada Konsep Hubungan Bangun Datar Segiempat Melalui Permainan Dengan Alat Peraga". *Konferensi Nasional Penelitian Matematika dan Pembelajarannya (KNPMP I)* Universitas Muhammadiyah Surakarta, 12 Maret 2016, hlm. 286.

[13] Eko Budiyanto, *Peranan Bermain Tangram Dalam Meningkatkan Motivasi Belajar Dan Kreativitas Berpikir Pada Siswa Kelas Iv Di Sd Muhammadiyah Program Khusus Surakarta*, Skripsi, (Surakarta: Universitas Sebelas Maret, 2004), hlm. v.

[14] Sugiyono. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D* (Bandung: Alfabeta, 2014) hlm 303

a) Normality Test

Normality test of two classes between the control class and the experimental class was performed using the ShapiroWilk test using the SPSS 16.0 for Windows program with a significance level of 0.05.

b) Homogeneity Test

Homogeneity test of two variances between the control class and the experimental class with the Levene test using the SPSS 16.0 for Windows program with a significance level of 0.05.

2) Test Assumptions for Final Data Analysis

a) T Test

After the two classes are normally distributed and have homogeneous variances, a similarity test of two averages with t-test is then performed. This calculation is used to determine whether there is a difference in the effect of a treatment that is imposed on a group of one-party research objects, namely the right-party test with a significance value of 0.05. The testing criteria were carried out using Independent Sample t-test with the assumption that both variances were homogeneous with a significance level of 0.05. Before analyzing the data, the researcher makes a hypothesis. The hypothesis testing of the t-test is based on the following conditions:

H_0 : Student learning outcomes that use the tangram module are the same as students who do not use the tangram module

H_1 : Student learning outcomes that use the tangram module are better than students who do not use the tangram module

b) N-Gain test

The purpose of calculating the gain index is to find out the increase in student learning outcomes between the experimental group using the tangram module and the control group not using the tangram module. The formula used to find out the gain index is as follows.

$$\text{Indeks Gain (g)} = \frac{\text{Skor post test} - \text{skor pre test}}{\text{Skor maksimal (100)} - \text{skor pre test}}$$

Kriteria Nilai

1. $g \geq 0{,}7$: high
2. $0{,}3 \leq g < 0{,}7$: medium
3. $g \geq 0{,}7$: low

C.   RESULTS& DISCUSSION

Researchers conducted a post-test activity to determine the level of progress that was achieved by students in the learning process during 5 meetings. This post test was arranged with a different problem from Pretest. Researchers do this to avoid the hallo-effect on respondents. Suharsimi Arikunto said that one of the mistakes was that there were certain impressions from the assessors of students, both from personal experience and information from others about the students.[15]

Learning with the developed tangram module has a positive influence on the value of student learning outcomes. Achieving the effectiveness of the module is shown by an increase in student learning outcomes in the experimental class better than learning outcomes in the control class.

In this study, researchers used two groups that are not equal (non equivalent) and then one group functions as a control group, and another one functions as an experimental group. On the homogeneity test results through the SPSS 16.0 for Windows program stated that the significance value of the ability of both classes regarding Mathematics ability is 0.152. Because the significance value is greater than 0.05, it is concluded that the control class and experimental class students come from populations that have the same variance, or both classes are homogeneous.

Quasi-experimental methods can be accepted if have a minimum sample of 15 subjects per group.[16]Researchers only took a minimum sample of 15 respondents in the control group and 15 respondents in the experimental group. In the control group learning is done without the tangram module. While in the experimental group, learning is done using the tangram module.

Researchers can analyze the weaknesses of students' knowledge from the results of the pretest in the concept of geometry. Dimyati and Mujiono explained that the learning outcomes were ultimately functioned and aimed at diagnosing students' weaknesses and strengths and their reasons. Based on this diagnosis the teacher held the development of learning activities to improve student learning outcomes.[17]

Improved learning outcomes obtained from posttest with independent samples t-test through the SPSS 16.0 for Windows program stated that the value of sig. (2-tailed). the ability of both classes in geometry is 0,000. Based on the results of processing it can be concluded that the learning outcomes (post-test) using tangram modules are better than conventional modules. This is evidenced by the higher average distribution compared to conventional modules

[15] Suharsimi Arikunto, Metodologi Penelitian, (Jakarta: PT. Rineka Cipta, 2002), hlm. 120
[16] Umar Husein, Riset Sumber Daya Manusia Dalam Organisasi (Jakarta: PT Gramedia Pustaka Utama, 1999), hlm. 67
[17] Dimyati dan Mudjiono, Belajar dan Pembelajaran (Jakarta: Rineka Cipta, 2006), hlm. 201

In addition, tangram modules with geometry material can effectively improve the learning outcomes of IVC graders at SDI Surya Buana Malang. Researchers see the average control class is smaller than the experimental class in the post test that is 73 <91.

The Gain Index in the high category experimental group was 66.67% and 0% in the control group. The medium category Gain index in the experimental group was 33.33% and 33.33% in the control group. The Gain index of the low category in the experimental group was 0% and 66.67% in the control group. The tangram module is significantly effective for improving mathematics learning outcomes in IVC graders at SDI Surya Buana Malang.

In the implementation of the pretest and posttest, there were several respondents who got the same score, increased, and decreased. The existence of stability, increase, and decrease in learning outcomes can be shown to be caused by several factors. This proves that if a successful learning process requires support and links several aspects.

There are two factors that can affect learning outcomes, namely internal factors and external factors. Internal factors, namely factors from within students such as physical and spiritual conditions of students. External factors are factors from outside students, such as environmental conditions around students.[18] In the observations, the most influential factor on student learning outcomes is internal factors, namely from the psychological aspects of students.

One aspect of student psychology is student learning styles. Learning styles are the preferred way of carrying out activities of thinking, processing, and understanding information.[19] The results of the research show that students who learn by using a dominant learning style, while taking a test will achieve a significantly higher score than those who learn in ways that are not in line with their learning styles.[20]

There are various learning styles, including auditory, visual, kinesthetic, global learning styles, and analytic learning styles. In this research process, the learning process is designed using the tangram module.

When viewed from the results of the gain index, students who are included in the low category can be predicted by several contributing factors, namely learning styles, student readiness, and student abilities. So, the existence of students who are in the low category in the gain index can be said to have a learning style that is less suitable when using teaching aids in the learning process.

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[18] Muhibbin Syah, Psikologi Belajar (Jakarta: Raja Grafindo Persada, 2004), hlm. 199
[19] Adi Gunawan, Geniius Learning Strategy Petunjuk Proses Mengajar, (Jakarta: PT. Gramedia Pustaka Utama, 2004), hlm. 139
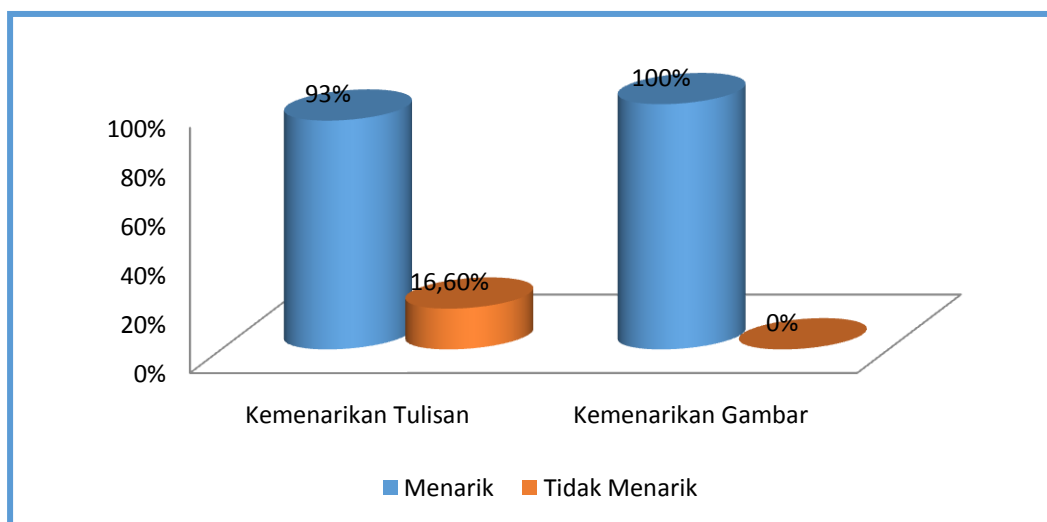[20] Umi Machmudah dan Abdul Wahab Rosyidi, Active Learning dalam Pembelajaran Bahasa Arab, (Malang: UIN-Malang Press, 2008), hlm. 1

Based on the results of the difference test it can be concluded that the learning outcomes (post-test) using the tangram module have a significant difference. This is in accordance with the results of research conducted by Muchayat namely mathematics learning devices with ideal problem solving strategies containing concept understanding can deliver students to achieve mastery learning beyond the minimum completeness criteria.[21]

According to the theory of Mulyanta and M. Marlon Leong The researcher also looked at the students' responses which consisted of three aspects, namely ease, attractiveness, and usefulness.[22]The researcher asks students to give their opinions on the tangram module related to these three aspects.

Overall user response that the tangram module has a positive impact on students. Students feel 100% interested in the tangram module from the drawing. Students also expressed interest in terms of fonts with a percentage of 93.33%. The researcher concludes that with students 'interest in displaying the modules, students' interest in reading will also increase. This is consistent with the benefits of the module that the module can increase the stimulation of student learning activities.[23]The results of the attractiveness response are illustrated in Figure 1.

Figure 1 Student Response to the Attractiveness of Using Modules

The quality of learning will improve if students have an interest and are active in the learning process. It is expected that a teacher is more varied in developing

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[21] Muchayat. Pengembangan Perangkat Pembelajaran Matematika Dengan Strategi Ideal Problem Solving Bermuatan Pendidikan Karakter, hlm. 200
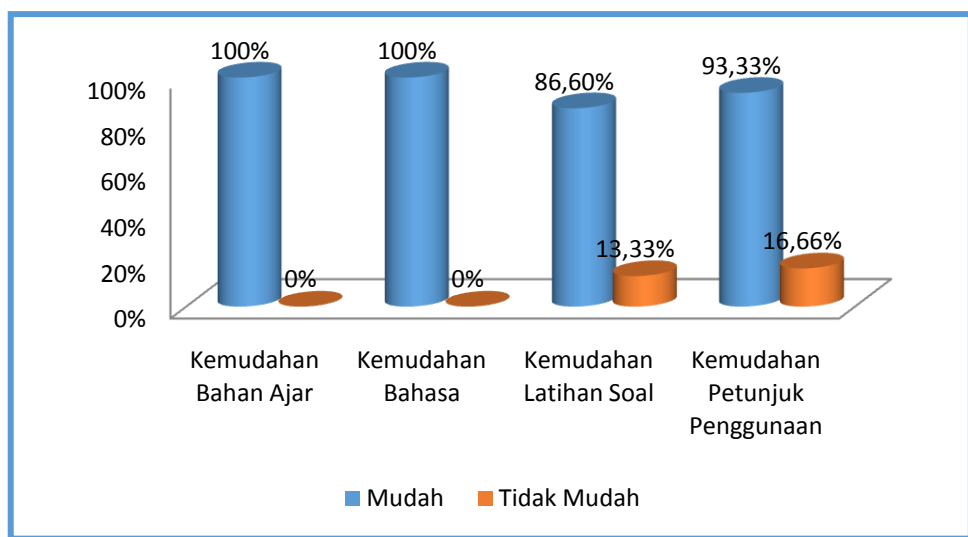
[22] St Mulyanta dan Marlon Leong. *Tutorial membangun multimedia interaktif Media Pembelajaran* (Yogyakarta: Universitas Atma Jaya, 2009) hlm. 3-4

[23]Azhar Arsyad, *Media Pembelajaran,* (Jakarta: RajaGrafindo Persada, 2010), hlm. 15

approaches or models and especially learning media because the principle of learning is an attempt to create conditions or supportive environmental systems.

Questionnaire student responses to the convenience category 100% of students stated that the tangram module made it easier for students to learn. 100% of students state that the language in the module is easily understood by students. 86.6% of students stated the assignments contained in the module were easy for students, and 93.33% of instructions were easy to understand for students.

Figure 2 Student Response to Module Ease

Not only that, students also stated that this module was very useful in learning. The researcher concludes that the Tangram module complies with the module's criteria.
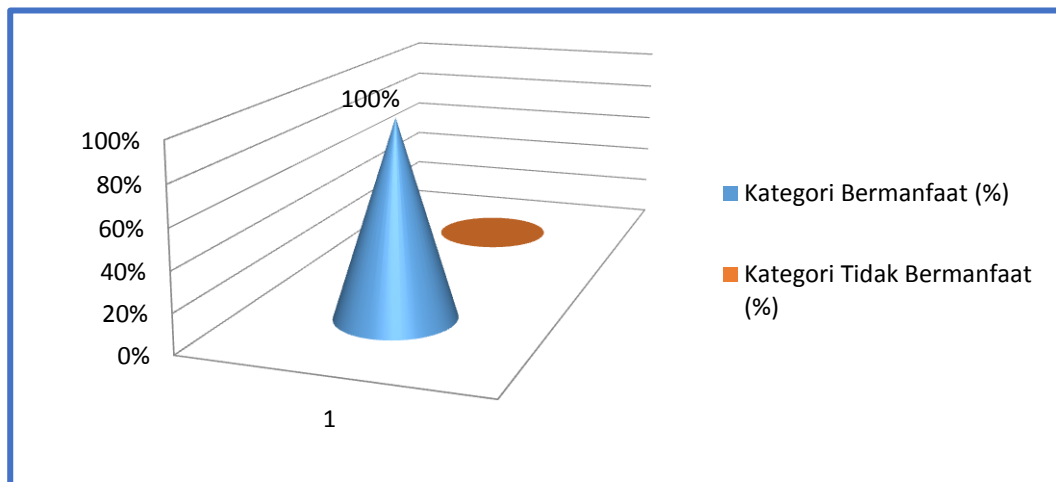
Figure 3 Student Response to the Benefit of the Module

Student responses to teacher stimulation can include various forms such as attention, internal processes of information, concrete actions in the form of participation in learning activities such as solving problems, working on assignments given by the teacher, and others. In the process of teaching and learning many student learning activities that can be pursued through response. These responses must be fostered in students.[24]

D. CONCLUSION

The learning outcomes of students who use the tangram module are better than students who do not use the tangram module, this indicates that the level of effectiveness of the use of tangram modules can improve student understanding in learning geometry. The tangram module also helps students form in-depth student knowledge. Tangram module user responses in learning geometry in class IV students at SDI Surya Buana Malang have a positive impact on students. The results of the questionnaire that was given to students showed high results. Student responses related to convenience, attractiveness, and usefulness.

REFERENCES

Amri, Sofan dkk. 2007. *Konstruksi Pengembangan Pembelajaran Pengaruhnya Terhadap Mekanisme dan Praktek Kurikulum*. Jakarta: PT.Prestasi Pustakarya

Anjarsari, Meisa Dwi. 2013. *Meningkatkan Hasil Belajar Materi Mengidentifikasi Sifat-Sifat Geometri Menggunakan Media Tangram di Sekolah Dasar*. JPGSD Volume 01 Nomor 02 Tahun 2013

Arikunto, Suharsimi. 2002. *Metodologi Penelitian*. Jakarta: PT. Rineka Cipta

Arikunto, Suharsimi. 2010. *Prosedur Penelitian: Pendekatan Suatu Praktik*. Jakarta: Rineka Cipta

Arsyad, Azhar. 2010. *Media Pembelajaran*. Jakarta: Raja Grafindo Persada

Berutu, Alaris. 2013. *Penerapan Metode Permainan dengan Berbantuan Tangram untuk Meningkatkan Hasil Belajar Matematika pada Materi Geometri*. Jurnal Penelitian Bidang Pendidikan Volume 19(1)

Budiyanto, Eko. 2004. *Peranan Bermain Tangram dalam Meningkatkan Motivasi Belajar dan Kreativitas Berpikir pada Siswa Kelas IV di SD Muhammadiyah Program Khusus Surakarta*. Skripsi. Surakarta: Universitas Sebelas Maret

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[24] Nana Sudjana, Cara Belajar Siswa Aktif Dalam Proses Belajar Mengajar, hal. 28.

Chambers, Paul. 2013. *Teaching Mathematics in Secondary School: and Practice*. London: Sage Publication

Collin, H. 2009. *Collins English Dictionary. Complete & Unabridge 10th Edition*. Amerika: William Collins Sons & Co. Ltd

Darhim. 1986. *Buku Materi Media dan Sumber Belajar Matematika*. Jakarta: Universitas Terbuka

Depdiknas.2003. *Pedoman Khusus Pengembangan Sistem Penilaian Berbasis Kompetensi SMP*. Jakarta: Depdiknas

Eviliyanida, 2010. *Pemecahan Masalah Matematika*. Jurnal Visipena 1, no. 2

Farida, Anisatul. 2016. *Analisis Miskonsepsi Siswa terhadap Simbol dan Istilah Matematika pada Konsep Hubungan Geometri Segiempat melalui Permainan dengan Alat Peraga*. Konferensi Nasional Penelitian Matematika dan Pembelajarannya (KNPMP I) Universitas Muhammadiyah Surakarta

Fiangga, Shofan. 2013. *Designing Tangram Game Activity As An Introduction to The Concept of Area Conservation in The Topic of Area Measurement*, Tesis: Pendidikan Matematika. Surabaya: Universitas Negeri Surabaya

Fiangga, Shofan. 2014. *Tangram Game Activities, Helping The Students Difficulty In Understanding The Concept of Area Conservation Paper Title*, Proceeding of International Conference on Research, Implementation and Education of Mathematics And Sciences 2014, Yogyakarta State University

Gall, Borg. 1983. *Educational Research An Introduction Fourth Edition*. London; Longman Inc

Gunawan, Adi. 2004. *Genius Learning Strategy Petunjuk Proses Mengajar*. Jakarta: PT. Gramedia Pustaka Utama

Hartono. 2012. *Pengembangan Modul Pendidikan Agama Islam Berbasis Pembelajaran Tematik Pada Siswa Kelas III MI*. Jakarta:Kemenag RI

Hatano, G. 1996. *A Conception of Knowledge Acquisition and Its Implications for Mathematics Education*. In L. Steffe, P. Nesher, P. Cobb, & G. Goldin (Eds.), Theories of mathematical learning. Hillsdale, NJ: Lawrence Erlbaum

Horn. 2003. *Penerapan Matematika Realistik pada Sekolah Dasar dan Madrasah*. Dep.Agama Medan

Husein, Umar. 1999. *Riset Sumber Daya Manusia Dalam Organisasi*. Jakarta: PT Gramedia Pustaka Utama

Ismail SM. 2008. *Strategi Pembelajaran Agama Islam Berbasis PAIKEM: Pembelajaran Aktif, Kreatif, Efektif, dan Menyenangkan*. Semarang: RaSAIL Media Group

Kantun, Sri. *Hakikat dan Prodesur Penelitian Pengembangan*. Jember: FKIP UNEJ

Karso. 2009. *Pembelajaran Matematika SD*. Jakarta: Universitas Terbuka

Katmada, Aikaterini, dkk. 2014. *Implementing a Game for Supporting Learning in Mathematics*, Electronic Journal of E-Learning 12, No. 3

Kesumawati, Nila. 2008. *Pemahaman Konsep Matematik dalam Pembelajaran Matematika*. Semnas Matematika dan Pendidikan Matematika 2008, Vol 2

Kramer, D. 1996. *OBE strategies, tools and techniques for implementing Curriculum 2000*. Florida Hills: Vivlia

Kristanti, Dewi. *Upaya Meningkatkan Prestasi Belajar Matematika Materi Geometri Melalui Media Tangram Pada Siswa Kelas VII SMP Negeri 25 Surabaya*. E-Jurnal Dinas Pendidikan Kota Surabaya; Volume 4

Leong, St Mulyanta dan Marlon. 2009. *Tutorial membangun multimedia interaktif Media Pembelajaran.* Yogyakarta: Universitas Atma Jaya

Lin, C.P., Y.J. Shao, L.H. Wong, Y.J. Li and J. Niramitranon, 2011. *The Impact of Using Synchronous Collaborative Virtual Tangram In Children's Geometric*. Turkish Online J. Educ.Technol.

Linstone, H. A.,Turoff, Murray, Helmer, O. 2002. *The Delphi Method Tehniques and Aplications*.

M. Rozzali, Abdullah, dkk. 2013. *Facilitating Students' Geometric Thinking Through Van Hiele's Phase Based Learning Using Tangram*. Journal Online of Social Sciences 9 (3). (http://www.thescipub.com/jss.toc)

Maletsky, Max A Sobel dan Evan M. 2002. *Mengajar Matematika: Sebuah Buku Sumber Alat Peraga, Aktivitas, dan Sinergi*. Jakarta: PT. Gelora Aksara Pratama

Muchayat. 2010. *Pengembangan Perangkat Pembelajaran Matematika Dengan Strategi Ideal Problem Solving Bermuatan Pendidikan Karakter*. Tesis

Mudjiono,dkk. 2006. *Belajar dan Pembelajaran*. Jakarta: Rineka Cipta

Nasaruddin. 2015. *Media dan Alat Peraga*. Jurnal Al-Khwarizmi Vol III No 2

National Council of Teachers of Mathematics. 2000. *Principles and Standards for School Mathematics*. Reston, VA: NCTM

Nursyamsu, M.Ud, 2017. *Al-Quran sebagai Sumber dan Ideologi Pendidikan Islam*. Jurnal Al-Muta'aliyah STAI Darul Kamal NW Kembang Kerang Volume 1 No 1

Nurtasari, Hanggana Raras. 2016. *Pengembangan Lembar Kegiatan Siswa (LKS) dengan Media Tangram Pada Pembelajaran Matematika Materi Jajargenjang dan Belahketupat*. Jurnal Ilmiah Pendidikan Matematika Volume 3 No. 5

Pehkonen, Erkki, dkk. 2012. *On Teaching Problem Solving In School Mathematics.* CEPS Journal: Center for Educational Policy Studies Journal 3, no. 4

Prastowo, Andi. 2011. *Panduan Kreatif Membuat Modul Inovatif*. Jogjakarta: Diva Press

Pujiati. 2004. *Penggunaan Alat Peraga Dalam Pembelajaran Matematika SMP*. Yogyakarta: PPPG

Rosyidi, Abdul Wahab. 2008. *Active Learning dalam Pembelajaran Bahasa Arab*. Malang: UIN-Malang Press

Sadiman, Arief. 2009. *Media Pendidikan Pengertian, Pengembangan dan Pemanfatannya.* Jakarta: Raja Grafindo.

Setyosari, Punaji. 2013. *Metode Penelitian Pendidikan & Pengembangan*. Jakarta: Kencana

Sudjana, Nana. 1990. *Teori-teori Belajar Untuk Pengajaran*. Bandung: Fakultas Ekonomi UI

Sudjana, Nana. 2005. *Dasar-dasar Proses Balajar Mengajar*. Bandung: Sinar Baru Algensindo

Sudjana, Nana. 2011. *Cara Belajar Siswa Aktif Dalam Proses Belajar Mengajar*. Bandung: Remaja Rosdakarya

Sudjana, Nana. 2011. *Penilaian Hasil Proses Belajar Mengajar*. Bandung: Remaja Rosdakarya

Sugiyono. 2014. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta

Suherman, E. 2003. *Strategi Pengajaran Matematika Kontemporer*. Bandung: Universitas Pendidikan Indonesia

Sumardyono. 2014. *Buku Pedoman Instrumen Validasi Alat peraga Matematika*. Yogyakarta: P4TK

Sundayana, Rostina. 2015. *Media dan Alat Peraga dalam Pembelajaran Matematika.* Jakarta: Rineka Cipta

Suryabrata, Sumadi. 1990. *Psikologi Pendidikan*. Jakarta: PT Rajawali

Sutan, F. 2003. *Mahir Matematika Melalui Permainan*. Jakarta: Puspa Swara

Suwangsih, Erna. 2012. *Teori Belajar Matematika*. Jakarta: Universitas Terbuka

Syah, Muhibbin. 2004. *Psikologi Belajar*. Jakarta: Raja Grafindo Persada

Turmudi, 2012. *Matematika Landasan Filosofis, Didaktis, dan Pedagogis Pembelajaran Matematika Untuk Siswa Sekolah Dasar*. Jakarta: Dirjen Pendis

Van den Akker J. 2006. *Educational Design Research*. London and New York: Routledge

Widoyoko, Eko Putro. 2012. *Evaluasi Program Pembelajaran*. Yogyakarta: Pustaka Belajar

Gates, Bill Les. 2016. *Geometry*. www.mathisfun.com

Zain, Aswin & Bahri Drs. Syaiful. 1995. *Strategi Belajar Mengajar*. Jakarta: Bhineka cipta