

Code: P-24

QUADRILATERAL MATERIALS DESIGN WITH FABLE "CATCHES DOG CAT" TANGRAM PUZZLE FOR STUDENTS AND CLASS II

Lisnani¹, Ratu Ilma Indra Putri², Somakim³
Sriwijaya University^{1,2,3}

Lisnanipcmtk@yahoo.com¹, ratu.ilma@yahoo.com², somakim_math@yahoo.com³

Abstract

Conventional mathematics learning is becoming obsolete and turned to introduce to students learning the importance of realistic mathematics education in the form of PMRI (Realistic Mathematics Education Indonesia). For some teachers segiempaf flat material up an abstract matter for second grade elementary school students. There are several studies on the use of flat wake tangram Ilma one of which is research that examines the mathematical communication in SDN 117. Therefore, the researchers designed a study that measures the mathematical creations by combining various activities using the tangram to create a context in the form of fables, puzzles, and the design of origami creations made aiming so that learners can recognize various forms of flat wake, train students' mathematical creativity, goal accomplished through the early stages in which students know and mathematical creativity in various forms up flat. Therefore, the researchers chose this type of research design research. Learning by using PMRI approach has helped many students to understand the concepts and see the relevance of learning mathematics. With PMRI approach, students can learn to use informal prior knowledge that leads to formal stage so that they can solve the existing problems in learning mathematics. The subjects of this study consisted of 34 students and one teacher from elementary school class II B 45 Palembang. Results of this study indicate that students develop mathematical skills creations so that learners can connect with other learning mathematics learning so that students felt that learning becomes more meaningful.

Keywords: *fable "dog cat catches", tangram puzzles, quadrilateral, instructional design, PMRI*

INTRODUCTION

Background

Math is very important to give to all the students, ranging from elementary school to the university. By the time the students sitting at the elementary level (SD), this was the forerunner to make the students become interested in math. The importance of understanding the concept of childhood for learners greatly affect the ability of learners to math. One of the goals of mathematics learning by the Education Unit Level Curriculum (SBC) is to equip learners with the ability to think logically, analytical, systematic, critical, and creative. Mathematics learning has an important role in improving the quality of education in Indonesia as well as to determine the competitiveness of a nation's education (Jalal et al, 2009:5). However, too many problems faced in mathematics learning from a learning process that is too monotonous, learning materials is less attractive because it is full of numbers and

formulas, the lack of interest of students towards mathematics, which is the conventional learning methods, and much more.

Therefore, education is crucial math since elementary math skills to learners as they continue their education to a higher level. When in elementary school, students need to get the basics of mathematics learning and the importance of math. However, not all of it is easy to understand the learning of mathematics by elementary school children as a whole. This is because mathematics is a subject that rarely favored abstract and children because there is a formula, and others. There are many materials that provide difficulties for learners grade II no matter the division and multiplication and geometry. Special to the material geometry, some teachers find it difficult to teach the material up flat, through learning with PMRI approach. Realistic Mathematics Education Approach Indonesia (PMRI) aims to improve the quality of mathematics education, is one of the efforts to change mathematics education in Indonesia. PMRI which was adapted from approaches developed in the Netherlands called Realistic Mathematics Education (RME).

According Gravemeijer (1994: 91) argues that there are three key principles that guided reinvention / progressive mathematizing, didactical phenomenology, self - developed models based on the view that mathematics is "human activity".

PMRI change the perception of students toward mathematics, which initially is something "abstract" to be as "real" for students. So that learning with PMRI approach is expected to improve the performance of Indonesian students both nationally and internationally. In addition to improving the quality LPTK supported, efforts to improve the quality of teachers and quality of teaching to support the development of PMRI also supported by numerous studies, especially research design (Sembiring, 2010:15). Design research is a research development / Development Research (Akker, Gravemeijer, McKenney, & Nieveen, 2006: 4). In addition, Barab & Squire (Akker, Gravemeijer, McKenney, & Nieveen, 2006: 5) defines a research design as an approach that aims to create a new theory, tools, practices and potentially useful impact on teaching and learning in natural background.

Study conducted by Ilma which aims to describe students 'mathematical communication skills during the learning process by using a flat material up PMRI in class II B SDN 117 tangram Palembang by using in his research that aims to see students' mathematical abilities. Researchers were interested in conducting research related to the flat up using tangram but with different packaging.

On the basis of the above, so that learners can understand the subject matter up flat geometry researchers PMRI approach to lead students to understand the material up this flat is through designing tangram in the form of fable dog catches the paint, tangram puzzles, and origami paper using the concept of tangram game in mathematics in grade II SD in recognizing shapes up flat. Tangram is a game that originated in China who use the media to square one in which contains pieces from the flat 7 up 5 triangles, 1 square and 1 parallelogram. Where to use tangram learners can create up to form various types of other flat, forming various animals or objects other woods, and ultimately understand the concept of a square formation.

There are many activities that can be done by using the tangram. In the first activity, researchers set up an interesting story about an animal called a fable that tells the story of a dog who wants to catch the cat. However, in the end it saves lives cats are

dogs. This made fable itself is simply designed with the goal of learners can obtain the message to be conveyed through the fables are often hurt although we must continue to help those who need our help. Through a fable that is designed to train the ability to read, imagine, understand, and retell the story. Fable created with the aim that learners can recognize shapes up like a flat square, triangles, parallelograms and other. Then, after getting to know the students are taught to count the number and grouping the wake-up. There was also the presentation of the tangram puzzle shapes will be more fun when played in groups, in this puzzle game to train the ability to think, concentrate, and patience in using tangram learners.

Coupled with origami creations that aims to look at the ability of learners to be creative by using the tangram square formed by developing the ability to play different colors and shapes in it so that naturally appear in mathematical learning mathematical creations. Mathematical creations are emphasized here is the ability of learners in mathematics learning with the creation of forms and colors on origami. It's very useful to see the creation of mathematical ability learners. Designing done through context tangram PMRI approach that appeals to students who sit in class II SD while studying the introduction of material up flat. So that students can easily understand the forms up flat. Based on the above, the researchers conducted a study entitled "Design Build Flat Materials Using Fable" Dog Catches Cat "and Tangram Puzzle in Class II SD"

Research Question

From the description of the background that has been presented, the formulation of the problem in this study are:

1. How appropriate strategies and approaches so that learners can recognize and classify various types of class II up flat in SD?
2. How to recognize mathematical creations learners in forming various objects, up flat, and animals using a variety of flat up through origami.
3. How to track learners' learning results on flat material up PMRI approach based on class II SD?

Aim

Based on the above issues, specific objectives of this study were:

1. Knowing the learners in mathematical creations form a square using origami creations.
2. Determine the ability of recognition and classification of various flat up through fable dog and cat catches tangram puzzle

While the general purpose of this study are: Produce trajectory learning for students through fable dog catches the paint, tangram puzzles, and origami creations in a flat up learning through PMRI Approach in Class II SD.

Method

This study uses a qualitative method that is deskriptif to answer the problem formulation in order to reach the research objectives. The study consisted of three phases that can be done repeatedly until the discovery of a new theory which is a revision of the theory of learning is tested. The stages are summarized in Figure 3.1 below.

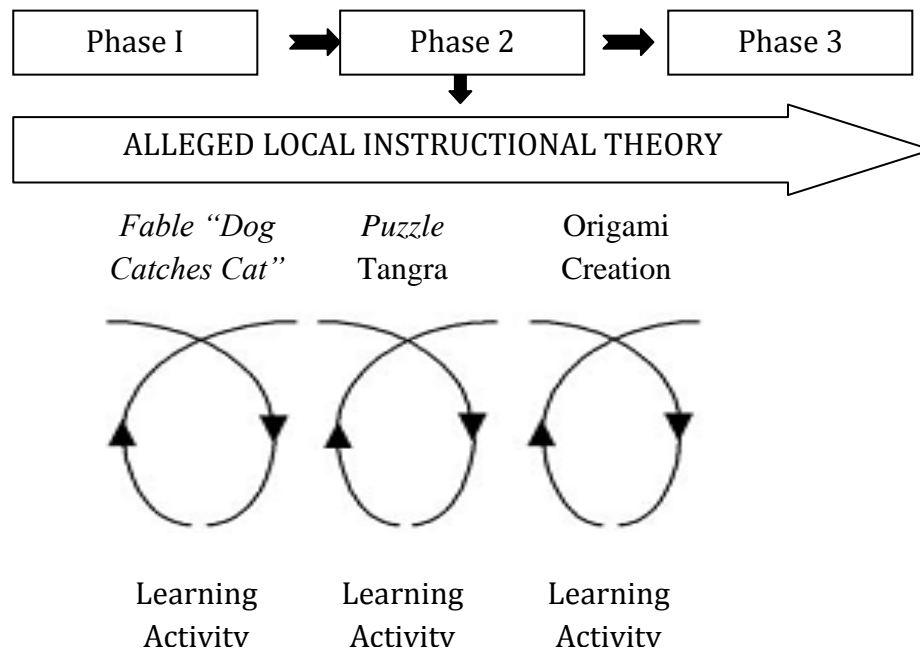


Figure 3.1 Stages of Research

1. Phase 1: Preliminary Design

At this stage, the initial idea began to be implemented as an inspiration from literature review before designing learning activities. There are 2 things that do, namely:

- a. Literature review, at this stage, a review of the literature concerning TVs up material using realistic mathematics education, forming the initial allegations in the subject of extensive flat wake.
- b. Designing Learning trajectory and Hypothetical learning trajectory, at this stage there is a series of learning activities which includes a conjecture which consists of learning objectives, learning activities, and learning devices. This conjecture is a reference to anticipate strategies and ways of thinking that emerged learners thrive on activity and learning, so it is dynamic and can be adjusted by the reaction of learners during the learning process.

2. Phase II: Teaching Experiment

At this stage, the activities carried out are holding trials of teaching activities that have been designed in the first phase. This test is divided into two experiments:

a. Pilot Experiment

Pilot Experiment is a bridge between the early design stages and experimental teaching. The purpose of a pilot experiment that explore learners' prior knowledge and adjustment Hypothetical Learning Trajectory (HLT) early. In the pilot stage of experiment, researchers took six students to serve as research subjects in the pilot the Hypothetical Learning Trajectory (HLT) initial designed by researchers. Begins with a pre-test to determine students' ability to recognize up flat. Then, researchers conducted activity 1, activity 2, and 3 activity ends with doing post-test.

b. Teaching Experiment

Aims to collect data to answer the research question (research question). Continuous process of teaching that emphasizes experiment ideas and initial allegations may be modified when the interpretation of the reasoning and learning of students in the classroom. Prior to its implementation, teachers and researchers to discuss further

activities will be implemented. Teaching experiment conducted by classroom teachers to all students who are not students as a pilot by researchers

MAIN SECTION

Result And Analysis

After a study by researchers, the results of research conducted include the following:

1. Preparation Research

Prior to obtaining the necessary preparatory course study the following research:

a. Preliminary Design

In the preliminary design stage, designing learning activities and the development of Hypothetical Learning Trajectory (HLT) is an important part to be observed and studied together. Designing learning activities can not be separated from the learning trajectory in which there are travel plans of learning materials. Learning trajectory acts as a picture sequence of learning through which students during learning activities on the topic of the introduction of a flat wake. Chronology of student learning in the form of an early stage of learning related to students 'prior knowledge of the situational problem to the next stage of learning that is designed to support students' ability to understand the concept of recognition, grouping and formation of various types of flat wake as in Figure 4.1 below:

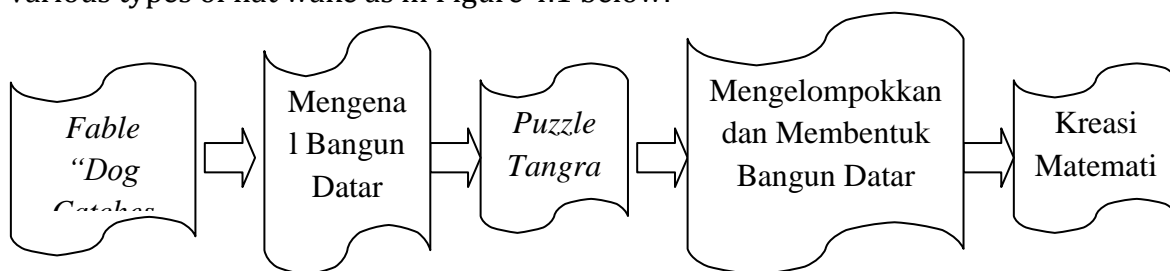


Figure 4.1 Tracks Learning Topics Introduction to Build Flat

The picture above shows the learning trajectory designed in recognition of learning, grouping and formation of various types of flat wake. Learning activities about the introduction, grouping and formation of various types of flat wake trajectory designed by students. Learning activities are divided into several different sections and each activity will achieve the recognition, classification and formation of various types of flat wake. Framework of learning activity recognition, grouping and formation of various types of flat wake in Figure 4.2 below.

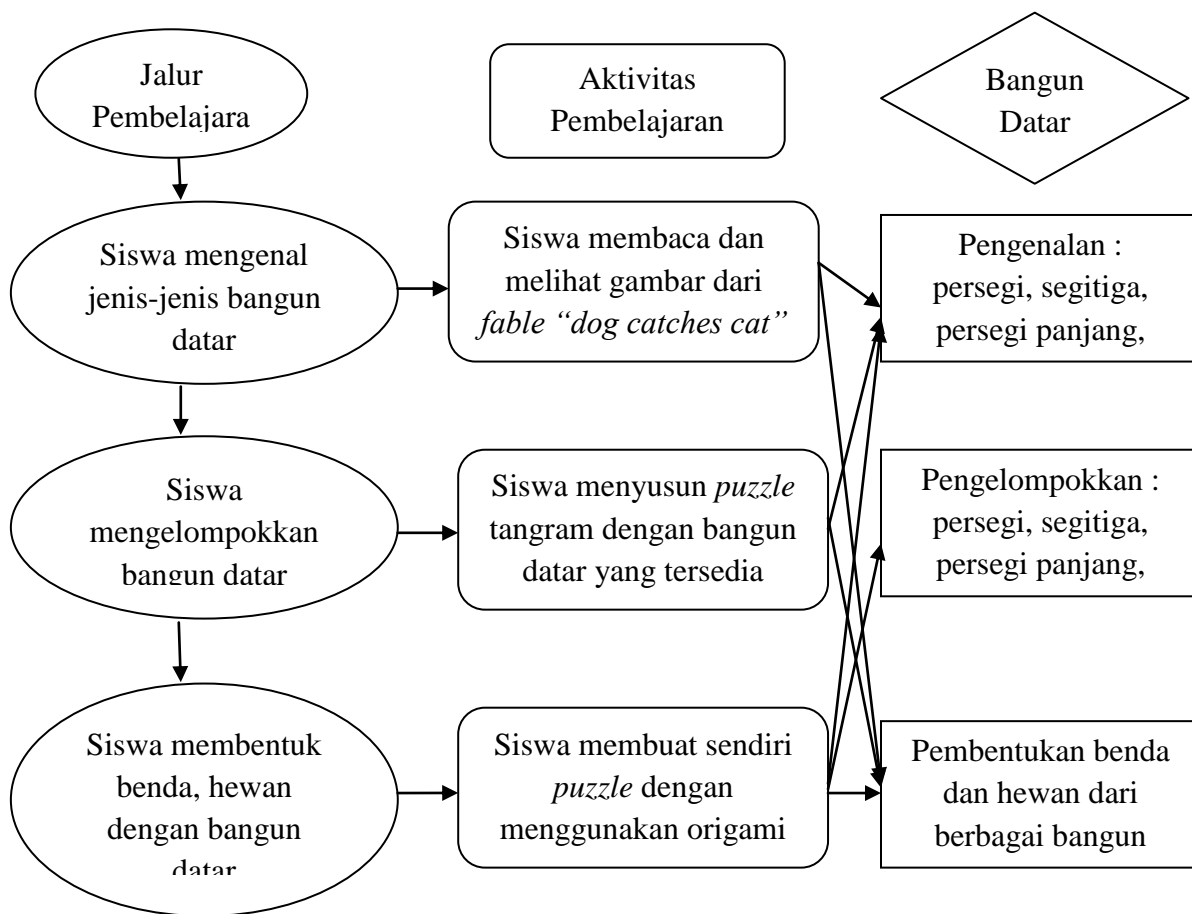


Figure 4.2 HLT Topic Introduction, Classification and Formation Build FlatB. Retrospective Analysis

1. The role of instructional design approach PMRI

The first formulation of the problem in this study is How appropriate strategies and approaches so that learners can recognize and classify various types of flat up in class II SD. To answer this problem formulation, we need to pay attention to the learning approach used in this study is the use PMRI approach. PMRI of this approach, it can be seen how the student interaction in learning.

How to recognize both the problem formulation of mathematical creations learners in forming various objects, up flat, and animals using a variety of flat up through origami. To answer this problem formulation, the researchers divided into 3 activities that learners mathematical creations seen by itself.

In the first activity in which students are expected to assist in identifying the forms up flat after students read and look at pictures in the fable "dog cat catches". Seeing this fable in mind that there are various forms of flat wake arranged so as to form a variety of shapes and objects that interest students. Not only that, students are expected to receive the message of the fable story. Problems given to students refers to the ability to read the story, understand the story, recognize shapes up flat, flat wake familiar with a variety of colors.

In the second activity, where students are expected to assist in classifying up flat in the form of puzzle pieces up in the form of a flat. Wherein the image cat-shaped puzzle, designed by the researcher based on the literature. Here students can exercise

their imagination and the ability to pair up flat into a perfect puzzle. Problems given to students refers to students' ability to classify flat up through the puzzle pieces up and play flat color. At this time the activity seen students' ability to present how to make the perfect puzzle.

In the third activity, where students are expected to form their own creations to make your own flat awake they want by using origami and a variety of other creations in the form of a flat wake, objects, animals, and more. This activity will appear on students' mathematical creations how students can create something different. This is where students learn the various forms of flat wake.

CONCLUSION

Conclusion

Based on the data obtained in this study, it can be concluded that:

1. So that learners can recognize shapes up flat and capable of classifying various types wake up flat there are several strategies that researchers are as follows: First, researchers do make flat material up through strategy fable "dog cat catches" where the students get to know the various forms of flat wake through a fable designed researchers with various objects and animals formed by combining a variety of flat wake up in the fable. Fable is designed to increase students' motivation in learning so flat material up into different recognition with conventional learning material. When finished reading the fable fable and learn the students are motivated to work on the problems that exist in worksheets related to fable and the introduction of a flat wake.

At the beginning of this strategy, learners are taught indirectly recognize the various forms up flat like a square, trapezoid, triangle, parallelogram, rhombus, and kite. Furthermore, students begin to classify the flat up through the tangram puzzle. This activity is used on a learning strategy by using a puzzle where students practice their skills in the wake classify existing data. The last strategy is to use origami creations here that looks kind of creativity of students in shaping up flat, breaks it, and form a new and different creations. Certainly supported the overall strategy used by the approach during the learning takes priority PMRI collaboration and interactivity students. PMRI approach provides role in helping students identify and classify various types of flat up in class II SD.

2. After identifying, classifying students wake up the next panel will perform using origami creations. From this students' mathematical creations more visible. Mathematical creations can be seen from the results of students' creations using a variety of shapes through origami shape up flat up flat objects, and animals. Creation of mathematical assessed students' abilities seem to come to know a variety of flat wake, until the student's ability menyusub flat up through the various puzzles, and various mathematical creations of students in shaping up flat into a variety of forms such as objects, animals, and wake up a new flat. Indirectly by the activities carried out so as to form a variety of creations that will present itself.
3. The study design will produce a learning trajectory Hypothetical Learning Trajectory (HLT) as the initial plan. However, in the end the change was intended to form a square up to form a variety of objects, animals or get up on the new flat

during the move. So that the resulting trajectory of learning in the form of Local Instruction Theory (LIT) on flat material up a growing recognition of the introduction of a flat wake, wake up to the creation of a flat. In the early stages, students only know up flat based fable "dog cat catches". Then once knew, students were asked to group up flat in the form of tangram puzzles, and the latter will be seen creations using students' mathematical origami creations and incorporates the concept of variety up flat to form a variety of objects, animals, and a new flat wake PMRI based approach for students of classes II SD.

Suggestion

1. Results of this study indicate student learning buffer according to the study design have been made. Therefore, to design more on the introduction of a flat wake at the primary school level, need to be developed in other mathematical material in greater depth in order to motivate students and to train students in developing students' mathematical creations deeper
2. Instructional design was designed based on the characteristics of PMRI. In this study, the researcher acted as a designer, developer, trainer, observer and also as a teacher in the pilot stage of experiment. Therefore, it is suggested to teachers in order to further develop the instructional design in other materials such as the researchers did.
3. Instructional design in this study takes a long time in their learning activities, expected seelanjutnya researchers can design a more in-depth learning so that students not only learn the introduction of flat even wake up in the application and implementation of the concept of a flat that leads up to the third grade elementary school materials

REFERENCES

- Akker, Jan van den, Gravenmeijer, Koeno, McKenney, Susan & Nieveen, Nienke. 2006. *Introducing Educational Design Research*. Jan van Den Akker, Koeno Gravenmeijer, Susan McKenney, dan Nienke Nieveen (Eds). *Educational Design Research*, 3-7. New York: Routledge.
- Apriani, Mia. 2012. *Desain Pembelajaran PMRI Materi Luas Bangun Datar di Kelas VII Sekolah Menengah Pertama*. Program Pascasarjana Universitas Sriwijaya.
- Cahya, Aviandri. 2012. *Pengertian tentang Matematika*. Tersedia dalam: <http://kuliahpgsd.blogspot.com/2012/01/pengertian-tentang-matematika.html>. Diakses tanggal 12 Februari 2013.
- Collins, Allan, Joseph, Diana & Bielaczyc, Katerine. 2004. Design Research: Theoretical and Methodological Issues. *Journal of the Learning Science*, (Online), Vo. 13 (1), 15-42, (<http://www.informaworld.com/smpp/title~content=t775653672>, diakses tanggal 6 Februari 2013).
- Djamarah Bahri, Syaiful. 2005. *Guru dan Anak Didik dalam Interaksi Edukatif Suatu Pendekatan Teoritis Psikologi*. Jakarta: Rineka Cipta.
- Effendy. 1994. *Komunikasi Teori dan Praktek*, Bandung: Remaja.
- Gautama, Paulus. 2010. *Tangram: Melatih Kecerdasan & Kreativitas Anak Edisi : Burung & Kucing*. Jakarta : Elex Media Komputindo.

- Gautama, Paulus. 2010. *Tangram: Melatih Kecerdasan & Kreativitas Anak Edisi : Orang & Aktivasnya*. Jakarta : Elex Media Komputindo.
- Gravenmeijer, Koeno. 1994. *Developing Realistic Mathematics Education*. Utrecht: CD- β Utrecht University.
- Gravenmeijer, Koeno, & Cobb, Paul. 2006. Design Research from a Learning Design Perspective. Jan van Den Akker, Koeno Gravenmeijer, Susan McKenney, & Nienke Nieveen (Eds). *Educational Design Research*, 17-51. New York: Routledge.
- Hadi, Sutarto. 2005. *Pendidikan Matematika Realistik*. Banjarmasin: Tulip.
- Ilma, R., 2011. *Improving Mathematics Communication Ability Of Students In Grade 2 Through PMRI Approach*. *International Seminar and the Fourth National Conference on Mathematics Education 2011 "Building the Nation Character through Humanistic Mathematics Education"*. Department of Mathematics Education, Yogyakarta State University, Yogyakarta, July 21-23 2011. Tersedia dalam: <http://eprints.uny.ac.id/1371/1/P%20-%2054.pdf>. Diakses tanggal 10 Februari 2013.
- Ilma R., 2010. Pengaruh Pendekatan Pembelajaran dan Bentuk Tes Formatif terhadap Hasil Belajar Matematika dengan Mengontrol Intelegensi Siswa SD di Palembang. *Disertasi* (tidak dipublikasikan). Universitas Negeri Jakarta. Tersedia dalam: http://p4mriunsri.files.wordpress.com/2009/11/sinopsis_disertasi_ratu_ilma_unsri_20101.pdf. Diakses tanggal 1 Februari 2013.
- Jalal, Fasli, Samani, Muchlas, Mae, Chu Chang, Stevenson, Ritchie, Ragatz, Andrew B., & Negara, Siwage D.. 2009. *Teacher Certification in Indonesia: A Strategy for Teacher Quality Improvement*. Jakarta: Departemen Pendidikan Nasional RI.
- Misdalina, Misdalina and Zulkardi, Zulkardi and Purwoko, Purwoko. 2009. *Pengembangan Materi Integral untuk Sekolah Menengah Atas (SMA) Menggunakan Pendekatan Pendidikan Matematika Realistik Indonesia (PMRI) di Palembang*. *Jurnal Pendidikan Matematika*, Volume 3 No.1, hal. 61-74. Palembang: Program Studi Pendidikan Matematika PPs-Unsri.
- Sembiring, R.K..2010. Pendidikan Matematika Realistik Indonesia (PMRI): Perkembangan dan Tantangannya. *Indo MS J.M.E*, Vol. 1 (1), 11-16. Tersedia dalam: <http://jims-b.org/wp-content/plugins/download-manager/process.php?did=4ee43848c9fcc>. Diakses tanggal 7 Januari 2013.
- Simon, M.A.. 1995. Reconstructing Mathematics Pedagogy from A Constructivist Perspective. *Journal for Research in Mathematics Education*, (Online), Vol. 26(2), 114-144. Tersedia dalam <http://links.jstor.org/sici?sici=0021-8251%28199503%2926%3A2%3C114%3ARMPFAC%3E2.0.CO%3B2-N>. Diakses tanggal 1 Januari 2013.
- Wikipedia. 2012. *Fabel*. Tersedia dalam: <http://id.wikipedia.org/wiki/Fabel>. Diakses tanggal 8 Januari 2013.
- Wikipedia. 2013. *Origami*. Tersedia dalam: <http://az.wikipedia.org/wiki/Oriqami>. Diakses tanggal 12 Februari 2013.

- Wikipedia. 2013. *Puzzle*. Tersedia dalam: <http://en.wikipedia.org/wiki/Puzzle>. Diakses tanggal 8 Januari 2013.
- Wiratama, Dian. 2012. *Tangrams: Puzzle Peningkat Kreatifitas*. Tersedia dalam: <http://dira89.blogspot.com/2012/07/hands-on-tangrams-puzzle-peningkat.html>. Diakses tanggal : 1 Februari 2013.
- Zulkardi. 2009. Developing a 'rich' learning environment on Realistics Mathematics Education (RME) for Student Teachers in Indonesia. *Indo MSJ.M.E.*, (Online), Vol. 1(1), 1-14. Tersedia dalam: <http://projects.gw.utwente.nl/cascade/imei/publication/PaperZulkardi.pdf>. Diakses tanggal 7 Januari 2013.