

Code: P-20

DESIGN RESEARCH IN PMRI: FLASH MEDIA TO SUPPORT THE FOURTH GRADE STUDENT LEARN GREAT COMMON DIVISOR (GCD) MATERIALS

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Abstract

The purposes of this research are (1) to know the roles of flash media in supporting the fourth grade student learn GCD materials by using PMRI (Pendidikan Matematika Realistik Indonesia or Indonesian Realistic Mathematics Education) approach and (2) to produce local instructional theory in GCD lesson. This research was conducted at the fourth grade of SD Yayasan IBA Palembang which is one of PMRI partner schools. The research method was used is design research with through three steps namely; preliminary design, teaching experiment, and retrospective analysis. The result of this research show that flash media; (1) can motivated the student to learn mathematics and (2) can be used to visualize the situations which are required to understand the concepts of common divisor's and GCD. The learning activities were done by student are producing learning trajectory such as (1) find out the common divisor of two numbers and (2) solve problems related to GCD.

Keywords: *flash media, GCD, design research, PMRI*

INTRODUCTION

The development of science and technology caused a revolution in teaching and learning. For example, learning media is made from wood, nails, goods, and so on, now can be replaced by digital tools that can be displayed online or offline by using technology. Based on the National Council of Teachers of Mathematics (Wood, 2012) states that technology can help students in learning and know mathematics through the instructions that were made by teacher and the teacher can more focus to prepare how the student learn. The technology can be used nowadays such as computer, LCD, iPod, Camera, Interactive whiteboard, websites, and others.

When computer had been created, the development of software that can be used to make learning media was always creating and developing. One of them is flash. The usefulness of flash are diverse, make flash much utilized today. One of them can be used to create flash media to support the student lean GCD (Great Common Divisor)

Based on Indonesian curriculum 2006, GCD material is the first materials studied in grade IV (KTSP, 2006). GCD is very essential material; because of it's to support materials at higher level such as make simple of fractions, factoring quadratic equations and so on. But the fact is the teachers usually teach this concept to students separately (Dogan, 2006). When this material was taught, firstly the teacher teach about factor of a number, then teach about factor of two numbers and find out the same factors (Musaqim & Astuty, 2008). So the students did not understand what the advantages in daily life about what they learned. Therefore, to make the concept of

GCD is meaningful and memorized, learning media and good learning approach are necessary to help students in learning and allows the students to feel the advantages concept of GCD by solving problems which often they found.

Learning approach that allows the connection between students' experiences with learning mathematics is Realistic Mathematics Education (Fauzan, 2002:34). Freudenthal (Gravemeijer, 1994:82) states that mathematics is human activity and learning of mathematics should be associated with reality. There are three principles of RME, namely guided reinvention through progressive mathematization, didactical phenomenology and self developed models or emergent models. Moreover RME also has five characteristics, namely use of contextual problems, use of models, use of students' contribution, interactivity and intertwining of learning strands (Zulkardi, 2001:2).

So, these issues encourage the researcher to do design research with PMRI approach which is helped by using flash media as tool to bridge contextual problem to “model of”, “model of” to “model for”, and “model for” to formal solutions.

DISCUSSION

In this research, the researcher only conducted first cycle in design research i.e. preliminary design, teaching experiment and retrospective analysis. In preliminary design, the researcher conducted analysis curriculum, make lesson plan which is consist of conjectures, make student worksheet and design flash media. Flash media was designed focus on function of media to help student move from situational problem to “model of”, “model of” to “model for” and “model for” to formal solution. The following is the design of flash media which was used during the lesson.

Ibu Abi membagi 12 buah strawberi dan 9 buah apel kedalam keranjang kecil. Masing-masing jenis buah sama banyak pada setiap keranjang kecil. Berapa keranjang kecil yang paling banyak yang diperlukan oleh Ibu Abi?

Jumlah Keranjang											
Jumlah Strawberi											
Jumlah Apel											
Sisa Strawberi											
Sisa Apel											

Kembali

Figure 1: Design of flash media

From the Figure 1, the steps of learning would be passed by student are:

- The student was given contextual problem related to GCD of two numbers
- The student used flash media on figure 1 to bridge from contextual problem to “model of” through divide fruit into small basket.
- The student fill out the table based on the activity in number 2

- The student used the table to find out the factor of numbers, common factor of two numbers and great common factor of two numbers.

Before this media was applied in classroom, firstly the teacher divided the student into 6 groups, each group there are 4 students. Then the teacher gave student worksheet to each group. In student worksheet there are 2 problems related to GCD of two numbers. The teacher asked to the student to read and try to understand the contextual problem in worksheet. Then the teacher guided them to solve problem by using flash media. The following is problem which have to be solved by student.

Mrs. Abi wants to divide 12 strawberries and 9 Apples into small baskets. If every small baskets contains same number of its fruits, find out the greatest number of small basket she needs!

To solve this problem, the student would use flash media to help them. Before that, the teacher demonstrated or gives instructions how to use it. This media is easy used by student, because of the student just dragged the object when they performed in front of class. In the figure below is activity of a group when they divide fruits into small basket.

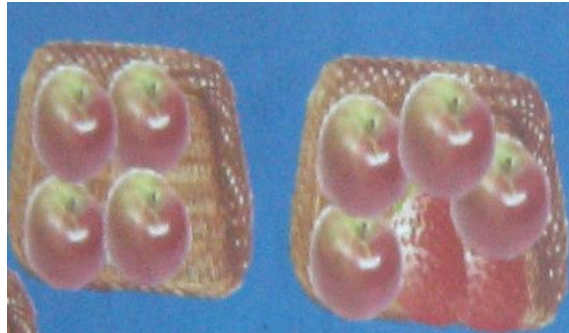


Figure 2: Activity of student when they divide 9 apples into two small baskets by using flash media

Figure 2 show that the students able to divide 9 apples into two baskets correctly and continue divide 12 strawberries into same small basket. When they already divide 9 apples and 12 strawberries into 2 small baskets, they write down the result on the table. But not all groups can divide these fruit into 2 baskets correctly. The following figure shows different answer of two groups when they divide 12 strawberries and 9 Apples into 2 small baskets.

Jumlah Keranjang	1	2	2		
Jumlah Strawberi	12	12	6		
Jumlah Apel	9	9	4		
Sisa Strawberi	0	0	0		
Sisa Apel	0	0	1		

Figure 3: The student write down the number of fruit for each small basket.

In figure 3, there is differences answer from 2 groups. The first group, they divide 9 apples and 12 strawberries into 2 small baskets, they divide fruit separately, first

small basket for apple and the second small basket for strawberry. So they write down number of apple in each small basket is 9 and number of strawberry in each small basket is 12 without remain. But, other group didn't agree with group who answer like that. They have other answer. They understood what the question is, so they found the correct answer. They write down if 9 apples and 12 strawberries divide into 2 small baskets then each small basket consist of 4 apples and 6 strawberries with 1 apple remain. The activity divided fruits continue till all table fill out.

The activity divided fruit by using flash media and do the worksheet is coincidence. So other groups try to fill out all tables without practice by using flash media when they understood the problem. The following is the result of student worksheet.

Jumlah keranjang kecil	1	2	3	4	5	6	7	8	9
Jumlah strawberi tiap keranjang	12	6	4	3	2	2	1	1	1
Jumlah apel tiap keranjang	9	4	3	2	1	1	1	1	1
Sisa strawberi	0	0	0	0	2	0	5	4	3
Sisa apel	0	1	0	1	4	3	2	1	0

Jadi, Faktor persekutuan dari 12 dan 9 adalah 3 .
 Faktor persekutuan terbesar dari 12 dan 9 adalah 3 .
 Jumlah keranjang kecil yang paling banyak diperlukan Ibu Abi adalah 3 .

Figure 4 result of student worksheet

In student worksheet is clearly that the student could find easily the solution of GCD problem, and they could determine the factor of numbers, the common factor of two number and GCD of two numbers. They also very enthusiasm when they solve problem by using flash media. Because this media is interesting for them, so they motivated to study. The picture below is the expression of student when they are using flash media.



Figure 5 the student expression when they is using flash media

CONCLUSION

Based on result of the research about design research on PMRI: to support the fourth grade student learn Great Common Divisor (GCD) materials

could be conclude that:

Flash media is very helpful the student to visualize the situations which are required to understand the concepts of common divisor's and GCD. This is caused by flash media can display the object of problem and the object can be moved.. Moreover flash could minimize the use of time.

Application of flash media to solve problem used levels on PMRI namely start from contextual problem, then the student guided to divide object (model of), the last one, the student fill out the table based on activity in " model of" (model for), and the last the student used the table to find out factor of numbers, common factor of two numbers and GCD of two numbers (formal)

REFERENCE

- Candra. (2006). *Flash Profesional 8 untuk Orang Awam*. Palembang: CV. Maxikom
- Depdiknas. (2006). *Kurikulum Tingkat Satuan Pendidikan (KTSP) 2006 Mata Pelajaran Matematika*. Jakarta: Departemen Pendidikan Nasional
- Dogan, O. (2006). *A Study on Pattern of 6th Grade Elementary Mathematics Lesson*. from: <http://etd.lib.metu.edu.tr/upload/12607985/index.pdf>
- Fauzan, A. (2002). *Applying Realistic Mathematics Education (RME) in Teaching Geometry In Indonesian Primary Schools*, Desertation: Eschende
- Gravemeijer, K. (1994). *Developing Realistic Mathematics Education*. Utrecht Technipress of Freudenthal Institute.
- Gravemeijer, K. (2004). *Local Instructional Theories as Means of Support for Teacher in Reform Mathematics Education*. *Mathematical Thinking and Learning*, 6(2), 1005-128, Lawrence Erlbaum Association.
- Gravemeijer, K., & Van Eerde, D. (2009). *Design Research as a Means for Building a Knowledge Base for Teaching in Mathematics Education*. *The Elementary School Journal* Volume 109 Number 5
- Mustaqim, B., & Astuty, A.(2008). *Ayo Bekajar Matematika: untuk SD dan MI Kelas IV*. Jakarta: Depdiknas
- Woods,D (2012). *Revolutionizing Mathematics with Technology Integration*. From: <http://researchinmath.blogspot.com/2012/12/revolutionizing-mathematics-with.html>
- Zulkardi. (2010). *How to Design Mathematics Lesson Based on the Realistic Approach?* From: <http://eprints.unsri.ac.id/692/1/rme.html>.
- Zulkardi, Nieveen N., Akker J. V. D., & Lange V. D. (2001). *Implementing A 'European' Approach To Mathematics Education In Indonesia Trough Teacher Education*. From: projects.gw.utwente.nl/cascade/imei/publication/paper ICTM2.doc.