

Code: P-2

LEARNING DESIGN ON WHOLE NUMBER ADDITION USING GASING METHOD

Adelia Pramariasta
STKIP Surya
adelia.rista@stkip Surya.ac.id

Abstract

Mathematics is one of the scariest for mostly elementary and junior high school's students. Because of that, students often experience stress. For solving that problem, Professor Yohanes Surya has made GASING method. That approach was used by researcher to make a learning design for whole number addition. The aim of this research is to know how we can use GASING method in learning whole number addition. Research methodology in this research is design research. This research explained learning step for whole number addition with GASING method. We use design research to achive this goal. As a result this research, students can understand whole number addition concept. GASING method can help student to understand whole number additions concepts. Steps that was throughed by student to learn whole number addition is students learned whole number addition by mountain and valley as concret things. Then students write whole number addition by mathematics symbol. Mentally is one of aassessment that teacher give to students.

Keyword : Design reserach, GASING method, Whole number addition.

INTRODUCTION

In Indonesia, mathematics is known as a lesson that has many formula and number which make students feel confuse. Most students in Indonesia assume that they can know mathematic's concept very well without understanding it. As a consequence, students often experience stress. And then student can't understand mathematic's concept very well. From that stress's feeling, student's feeling can become frighten on mathematics. Because of that feelings, students have a bad scores for a mathematics lesson. For solving that problems, Professor Yohanes Surya intoduces a method that called GASING method or easily,fun, and meaningful mathematics. GASING method is learning and teaching method that help students understand mathematics concept easily, fun and meaningful learning. With this method, students can understand mathematic's concept easily. One of mathematic's concept that students unable understand easily is whole number additions concept. Because of that, this research search about learning process on whole number addition with GASING method.

The philosophy of GASING method is there is no children cannot learn mathematics, only children who do not have good opportunity to learn mathematic in fun and meaningful way. (Surya,2012) Learning process by GASING method is learning process in easy, fun, and excited or meaningful way. Easy (*Gampang*), students are intoduced mathematical concept that is easy and remember. Fun (*Asyik*), students have motivation which come from themselves to learn mathematics. Exciting (*Menyenangkan*), more in direction of outside influence such as games. Because of

that influence, students are exciting to learn mathematics. (Surya. 2012) In Gasing method, learning process starts from concret things according to mathematic concept that will learn. In this research, concret things that were used are “mountain” and ‘valley’. Afterwards, students write mathematics concept in formal mathematics concept. Learning by Gasing method used mentally as one of student’s assesment. In GASING method, mathematics have critical point for every section. Critical point is learning process that must be passed by students. Whole number addition is one of critical point in mathematics. If students want to understand fractional addition operation in the next section, then they have to understand whole number addition.

This research aimed to know step of learning happened on whole number addition by GASING method. Moreover, the goal of this research is to investigate how role of GASING method support whole number addition learning. Based on the aim of this reserch, researcher made some of research question. First, how step of learning happened on whole number addition by GASING method. Second, how the role of GASING method towards learning process on whole number addition.

Researcher used design research as research tools Cobb, Stephen, McClain, & Gravemeijer (in Widjaja, Fauzan, Dolk: 2009) defined design research is research that aims to develop sequence of activities and to grasp an empirically grounded understanding of how learning works. The phases of design research are (1) Preliminary design, researcher made design of learning activity and hypothetical learning trajectory. In this phase, a sequence of instructional activites containing conjecture of student’s thinking in learning whole number addition by Gasing method. (2) Teaching experiment, this phases aimed to collect data for answering research quetions. Learning process inthe classroom happened based on design of learning activites that was made by researcher. (3) Restrospective analysis, hypothetical learning trajectory was used as guideline and point of reference in answering research quetions. Data source in this research are observation sheet, the results of assesment, and videotaping. Afterwards, data were analyzed based on hipothetical learning tajectory. This research have done on 9 Sepetember until 12 September 2012. Subject of this research is 9 Surya Intensive Programme’s students. This paper will look into the one of outcome design research study, and focusing on the role of GASING method in learning whole number addition. In contrast, teacher in Indonesia always start from abstract to teach mathematics concept, the design of activites aim to use concret things to understand whole number addition.

THEORETICAL FRAMEWORK

Results of research show that GASING method can be used to help students understand whole number addition. In this research, students used “mountain” and “valley” as concret things in GASING method. In learning process, teacher plays role as a facilitator to help guide students and lead classroom discussion. In this research, learning trajectory that have been happen is students used “mountain” and “valley” as concret things in whole number addition. After they used concret things, students wrote whole number addition in formal mathematics concept. Afterwards, mentally was used as one of student’s assesment. Learning process that have been happened in the classroom shows that students can understand whole number addition by using “mountain” and “valley” as concret things.

Preliminary Design

In this phases, initial ideas were implemented, which were inspired literature about GASING method and whole number addition before designing the instructional activities. Then researcher design learning design and hypotetical learning trajectory based on GASING method. In GASING method, learning process starts from concret things. In this research, concret things that was used are “mountain” and “valley”. The following is a general overview of student’s learning line in learning whole number addition.

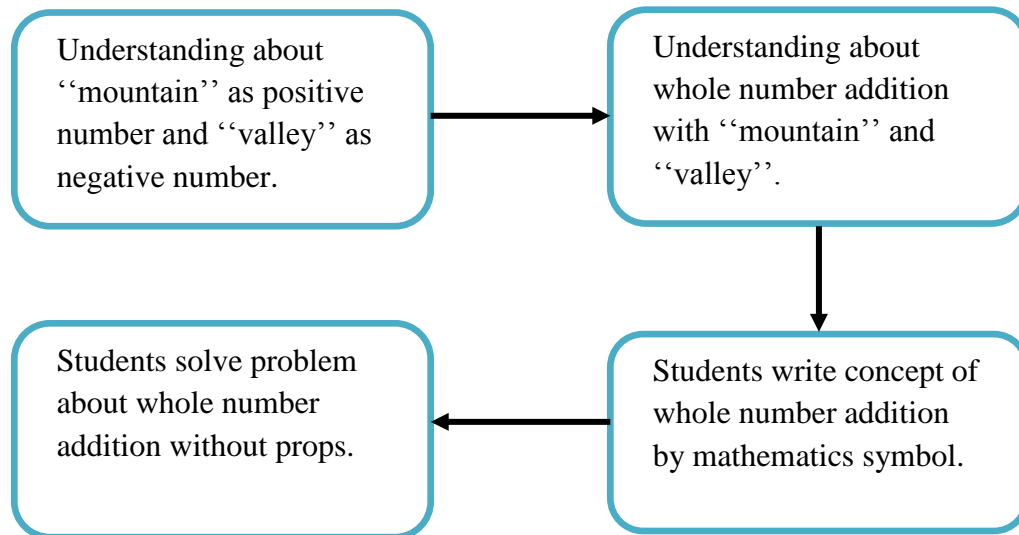


Figure 1. HLT in whole number addition learning

The explanation of figure 1 above is as follows :

- (1) Students understand “mountain” as positive number and “valley” as negative number. For example, if teacher shows 3 mountains, then students will say positive 3. On the other hand, if teacher shows 2 valleys, then students will say negative 2.
- (2) Students learned whole number addition by “mountain” and “valley”. For example, 3 mountains added to 2 mountains equals to 5 mountains. 5 mountains added to 3 valleys equals to 2 mountains, etc.
- (3) Students understand formal mathematics concept about whole number addition. In this activity, students write whole number addition by mathematics symbol. For example, students write ‘3 mountains added to 2 mountains equals to 5 mountains’ as $3 + 2 = 5$. The other example is students write ‘5 mountains added to 3 valleys equals to 2 mountains’ as $5 + (-3) = 2$.
- (4) Students were given assesment by teacher, such as mentally and written test.

Learning activities have been designed based on hypothetical learning trajectory and student’s thinking. The folowing is learning design that have been design based on GASING method.

Table 1. Table of instructional design

Concret	Abstract	Mentally
Understanding “mountain” as positive number and “valley” as negative number.	Write down many “mountain” as positive number and many	Answer the teacher’s question about the meaning of many



Figure 2. "mountain"



Figure 3. "valley"

Add positive number and positive number using props mountain and valley. Examples : Three mountains added to two mountains equals to five mountains.



Figure 4. Five 'mountain's.

The same way is used to add negative number and negative number.

Add positive integer and negative integer using props mountain and valley. Examples :

1. One mountain added to one valley equals to zero(0).



Figure 5. One mountain added to one valley.

2. Three mountains added to two valleys equals to one mountain.

"valley" as negative number. Examples :

- 1) Two 'mountain's write down as 2.
- 2) Three 'valley's write down as -3.

"mountain" and "valley" by mentally.

Write the addition of mountain and mountain and valley and valley with numbers by mathematical symbol. Examples :

1. Three mountains added to two mountains equals to five mountains. It write down as $3 + 2 = 5$.
2. Three valleys added to two valleys equals to five valleys. It writes down as $-3 + (-2) = -5$.

Write the addition mountain and valley with number and mathematical symbol. Examples :

1. One mountain added to one valley equals to zero. It writes down as $1 + (-1) = 0$.
2. Three mountains added to two valleys equals to one mountain. It writes down as $3 + (-2) = 1$.

Calculate the addition of positive integer and positive integer and negative integer and negative integer without props and answer them by mentally.

Calculate the addition of positive integer and negative integer by mentally.



Figure 6. Three mountains added to two valleys equals to 1 mountain

Teaching Experiment

In this phase, researcher conducted instructional design that have been designed in preliminary design phase. In learning process, teacher invites students to distinguish mountain and valley as positive number and negative number. Thereafter, students calculate whole number addition by mountain and valley. After students knew about whole number addition using 'mountain' and 'valley', students wrote whole number addition by mathematical symbol, and then students get a tests from teacher. That tests consist of the mental arithmetic evaluation (mentally) and written evaluation. In the learning process, teacher tried to make fun learning activities. Because of that, students were divided into 4 groups. For each group, students have to choose a name for their group. They choose a name of traditional things from Papua for their group's name. Besides that, students also create yels as group's identity. If teacher call a group by mention name of group, then students have to shout group's yels. Because of that, whole number addition learning can become fun mathematic learning.

Retrospective Analysis

In learning process using GASING method, 'mountain' and 'valley' have been used as concret things to instill whole number addition concept. Researcher could answer research questions based on student's activities. The following is description of retrospective analysis.

- a) Steps of learning happened on whole number addition by GASING method are students used "mountain" and "valley" to interpret integer. Students added whole number using "mountain" and "valley", and then students have written whole number addition by number and mathematical symbol. Afterwards students were invited to calculate whole number addition by mentally.
- b) When students learned about positive number and positive number addition, students used mountain as starting point. To calculate positive number and positive number addition, students only calculate how many mountains on the table. For example, students have to calculate '4 mountains added to 3 mountains'. So students calculate how many mountains on the table. As conclusion, there are 7 mountains on the table.

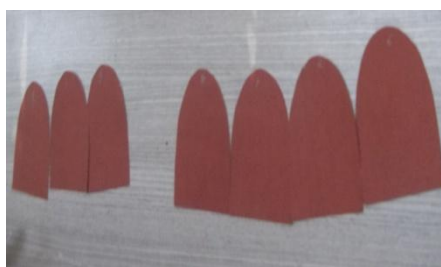


Figure 7. Three mountains added to four mountains

- c) When students learned about negative number and negative number addition, students used valley as starting point. To calculate negative number and negative number addition, students only calculate how many valleys on the table. For example, students will calculate '2 valleys added to 1 valley'. So students have to calculate how many valleys on the table. As a conclusion, there are 3 valleys on the table.



Figure 8. Two valleys added to one one valley

- d) When students learned about negative number and positive number addition, students used mountain and valley as starting point. To calculate negative number and positive number, students have to put some mountain into some valley. Afterwards, students calculate how many mountain or valley which is not put into valley. For example, students would calculate '3 mountains added to 2 valleys'. Furthermore, students put 2 mountains into 2 valley. Then students found that there is 1 mountain which was not put into valley. As conclusion, 3 mountains added to 2 valleys equals to 1 mountain.



Figure 9. Students calculate '3 mountains added to 2 valleys' .

For another example, students would calculate '4 valleys added to 3 mountains'. Furthermore, students put 3 mountains into 3 valleys. Then students found that there are 1 valleys which was put into mountain. As conclusion, 4 valleys added to 3 mountains equals to 1 valleys.

- e) After students calculate whole number addition using mountain and valley, students will write whole number addition by number and mathematics symbol. Students have not used mountain and valley for problem solving. The following picture shows that students can calculate whole number without mountain and valley. Students can also write mathematics symbol based on whole number addition using mountain and valley.



Figure 10. Students calculate whole number addition without mountain and valley.

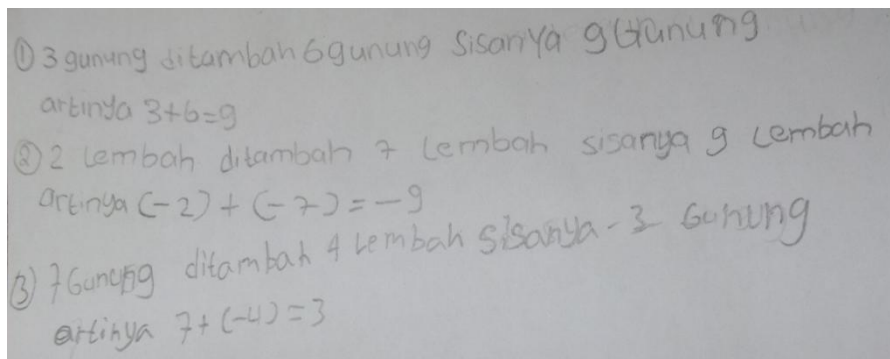


Figure 11. Students wrote whole number addition by mathematics symbol.

- f) After students can calculate whole number without mountain and valley, teacher give a tests to students. The aim of that test is to know understanding's students about whole number students. Tests which have been given to students are written evaluation and mental arithmetic activity. The following conversation showed that students calculate by mentally.

Teacher : "What is the meaning of eight mountains added seven mountains?"

Student : "8 + 7."

Teacher : "How many?"

Student : "15." (Without any props and answer them by mentally.)

The following figure is student's worksheet in the written evaluation.



Figure 12. Student's worksheet

Learning trajectory that have been designed in preliminary design phase is learning trajectory that have done at research. Students activities in the instructional design guides them to understand whole number addition.

- g) The role of GASING method towards learning process on whole number addition is bridges between concret things and whole number addition. With 'mountain' and 'valley', students can add whole number easily. Moreover, students have motivation which come from themselves to understand whole number addition. Because of that motivation, students feel exciting to study mathematics. Therefore, students did not feel stress and confused about whole number addition. Students worksheet shows that students could understand whole number addition.

CONCLUSION

Based on the research result, research conclude that GASING method has an important role in whole number addition learning. With GASING method, students can understand the concept of whole number addition using concret things, that are known by students, namely mountain and valley. At first, students understand the context of whole number addition in the mountains and valleys, then students write whole number addition with number and mathematical symbol. Afterwards, students were given a test, such as written test and mentally. Suggestion can be given by researcher is teacher and researcher should make good communication related to instructional design that have been designed by researcher. It is useful to minimize

the errors that occur during the learning process so that the purpose of research can be achieved. Moreover, mountain and valley can be developed for teaching subtraction of whole number using GASING method.

REFERENCES

- Surya, Y. (2012). *Buku Petunjuk Guru: Pintar Berhitung GASING*. Tangerang: PT. Kandel.
- Surya, Yohanes., Moss, Meg. (2012). Mathematics Education in Rural Indonesia. *Proceeding in the 12th International Congress on Mathematics Education: Topic Study Group 30*, pp. 6223-6229. Seoul: Korea National University of Education.
- Van de Walle, J.A, dkk. 2010. *Elementary and Middle School Mathematics: Teaching Developmentally*. United States of America: Pearson Education, Inc.
- Widjaja, W., Fauzan, A., & Dolk, M. (2009). *The role of contexts and teacher's questioning to enhance students' thinking*. In U.H. Cheah, Wahyudi, R.B. Devadson, K.H. Ng, W. Preechaporn, & J.C. Aligaen (Eds.), *Proceedings of the 3rd International Conference on Science and Mathematics*. (466-474). Penang: SEAMEO RECSAM.