The Effectiveness of Think, Talk, and Write Models on Avoiding Pseudo Thinking at Christian University of Indonesia

Stevi Natalia
Mathematics Education Department, Christian University of Indonesia, Indonesia

Abstract

This study is about the effectiveness of think, talk, and write model on avoiding pseudo thinking at Christian University of Indonesia, it aimed to investigate whether think, talk and write model can avoid the pseudo thinking. It was done at Christian University of Indonesia. The method of this study is a classroom action research, the subjects of this study the Mathematics Student of 2015 batch. The instruments used to collect the data were observation sheet, interview guidance, questionnaires sheet, document, and audio-visual recorder. The results showed that the application of Think, Talk and Write (TTW) model was successfully helped to avoid pseudo thinking on Learning Statistics. This model is able to activate students' thinking activities through three stages. The three stages are also able to record the development of student's thinking structures well. Students are able to experience the assimilation process that is to adjust the scheme of problems provided with the scheme they already have, and do the decomposition of the scheme when finding a new or more complete problem scheme, to avoid pseudo thinking. So, it is concluded that the model is very effective to be implemented by lecturers when teaching Statistics.

Keywords: pseudo thinking, assimilation, scheme, effectiveness

A. Introduction

This research is an action research which tries to develop the ability of students' thinking with an effort to avoid the proses of pseudo thinking. This research was doing because the effect of the pseudo thinking in a learning process in a class is big. Pseudo thinking is a thinking process which makes an assumption that the students have already achieved the competence that expected but in fact, the way of thinking is not true. As an introduction experiment and a initial schema of students, the researcher made a writing test and an interview to find how far the pseudo thinking happened to the students which as a subject, based on the result of writing test and an interview, the researcher found that the five research subjects have the experience of the pseudo thinking in Statistic subject. This thing happened when the research subject was not able to explain the meaning of each question, they could answer the questions, but they did not follow the process of thinking that should be.

Vinner (1997) says that in a real lesson, learners intellectually respond to the topics being studied. Where this is mentioned as a cognitive commitment, it is a process where a learner is prepared to assimilate the new information that he or she receives into the cognitive structure that he or she has and / or, the learners accommodate the new structure that possible.

Thinking pseudo can happen because of many factors. These factors determine how the structure of thinking occurs during learning. Thinking pseudo happens unnoticed because the ability of learners is only judged based on the results of a written test that they can work on. Thinking pseudo only uses the most basic level of thought process that is memory or memorization. By memorizing learners are able to answer the questions that given but not because through the process of thinking that should be but only because learners are able to remember or memorize the procedures that provided.

Furthermore, Piaget in Subanji explains that cognitive structure is a schemata, a collection of basic scheme. An individual can provide understanding and respond to the stimulus because of the workings of

the schemata, the schemata develops due to the interaction of individuals with their environment (adaptation). Therefore, person who matures has more complete cognitive structure than person who immature. The schemata will arrange certain reasoning patterns in mind. The good quality of schematic, the better of the patterns of one's reasoning will be.

Afterwards Piaget in Subanji (2011) said that the process of adaptation is the process of forming the schemata through direct interaction with the environment that through the process of assimilation and accommodation. Assimilation shows the ability to explain an event based on a scheme which already in possession. Assimilation process occurs when the problem structure is in accordance with the scheme owned, so that someone can immediately interpret (correctly) the problem based on the scheme owned. While accommodation is a process of integrating the new stimulus through the establishment of a new scheme to adjust the stimulus received, so that the end result of the accommodation process is the formation of a new scheme that is more complex and intact.

Subanji adds that the occurrence of pseudo thinking process begins because of the incompleteness of thinking substructure in the process of assimilation. This can be caused by many factors both in the learner and the teacher who taught the material when the formation of the scheme occurred. Therefore, the explanation of the material which adjusted with the scheme of the learners will maximize the teaching and learning process because it will impact on the ease of the assimilation and accommodation process.

Assimilation and accommodation are things that happen if and only the learners activate their thinking process during the lesson. The activeness of the thinking process of learners is a rarity in nowadays. Learners have been spoiled with the generation of all-round instant, not only that the model of learning that has been applied is also difficult to lure the learners' activeness because all the learning materials have been presented by the teacher.

The learning model of TTW is one of the learning models that provoke the learner's activity. This model was introduced by Huinker and Laughlin. Think, talk and write is one of cooperative learning strategy. Through the three stages given, the participants are conditioned to activate their thinking process. In addition, the TTW learning model is also good at recording the development of thinking structures experienced by the learners through these three stages. Thinking stage is a stage that provokes the activeness of individual learners' thinking. At this stage the learners activate the thinking process by working on the problems given, activating the thinking process through solving this problem also provoke the occurrence of assimilation when learners already have the same scheme with the structure of the given problem. Then the problem is discussed in groups through the talk stage. The ability to communicate the material and debate it, of course, can improve the thinking stage of memory to reasoning. This stage is a stage that can provoke the occurrence of accommodation. Arguing and giving opinion is able to decipher the structure of thinking into simpler forms and form a new scheme, furthermore this understanding is sharpened through the third stage of write. At this stage, learners write down the conclusions that gained during learning into an understandable language.

B. Research Methodology

This research is a classroom action research which had been conducted from 1st cycle in order to avoid the *pseudo* thinking process in Basic Statistic class through TTW model. The classroom action research was introduced for the first time by American Social-Psychologist in 1946, then developed by other experts such as: Sthepen Kemmis, Robin Mc.Taggart, Jhon Elliot, Dave Ebbutt, etc, meanwhile in Indonesia the classroom action research has been known in the late of 80's.

This research was conducted in the beginning of the even semester, March–April 2016. This research had been held for six meeting with the weight of credit is three or one hundred and fifty minutes

for each meeting. This research had also five research subjects out of 18 students in Basic Statistic class. The researcher chose these five subjects by using purposive sampling.

This Class-Action Research collecting the data through these following activities: a) field note and describing; b) transcript from *Open-endedinterview* and *openquestion*; c) notes/written test result; and d) photos, videos, and voice record. data analysis method is the important thing in a qualitative research. The limitation of presenting the data happens when the students try to describe the activity in sentences. It is better for the researcher could analyze the data given objectively. Furthermore, it is important to pay attention to the accuracy of the data that is used, since a lot of data that the researcher will be obtained. Therefore, this phase will be conducted in three stage: Reduce the data, Triangulation, and Conclusion.

C. Result and Discussion

In 1st Cycle, we conduct three meetings with the weight of credit is three (3x50 minutes) for each meeting. 1st Cycle, has gone well with the learning activity, the students in each group play their role actively in group discussion and class discussion which is guide by the lecturer. Earlier, looks like the students has the same understanding but when they are confronted with some unique data that they have found in group, it makes the students try to grasp the definition from the Central Tendency.

Each member of Research Subject group has the same answers, four out of five students, choose the average as the most appropriate central tendency and representing number out of many numbers that they get. In class discussion, which guide by the lecturer, the other groups presentation makes Research Subject group sees that the average isn't always represent other group of number. With the differences that the groups have, each group try to defence their opinion. The weakness that found in the discussion is not every group can admit their mistake. Some students still stand on their opinion. Some students keep the answer since they still look for the right answer. However, after they are seeing unique data from the other group, each group realize that there is more than one central tendency can be used to be representation of the collecting data that available. The diverse data that present by each group lead students to see that there is an advantage and weakness of each central tendency data, so it is important for them to understand each available central tendency. 1st Cycle success to make the students experience assimilation of accommodation. It proves from the result test and interview.

The 2nd Cycle also conducting in three times and has three credits. The learning activity still take place in this stage to force the students has a better comprehension. At first, the students seem feel strange with the definition of Measures of Dispersion, specifically standard deviation, it looks when the researcher conducting first interview of observation testto five research subjects. Yet, by using the simple exercise that is taken from 1st Cycle, the students know the use of measures of dispersion, especially standard deviation, as a measurement to describe entire description and representation of data collection. In this cycle the students are also able to build a complete and complex of structure thinking about measures of dispersion.

The discussion of the test result state that each research subject has different structure of thinking. The difference that they own will not keep them away to develop their thinking structure during the learning activity. These five research subjects have their thinking structure develop and build critical thinking habit in order to understand a lesson. S_1 is the research subject who has different thinking structure than the others. Yet, in the end of the cycle, S_1 has a complete thinking structure, just like the others. S_2 has a similarity like S_3, both of them has a good thinking structure but not complete, while S_4 actually has a good thinking structure but it come through incompatibility so the subject needs reflection at first. Different case happens with S_5. Though he is same as S_4, in fact S_5 doesn't have a good structure of thinking in the beginning of research. But in the end, it becomes complete after receiving some treatments. Pseudo thinking can be avoided by emphasizing the definition of each material given to them. It helps them understand the lesson and activate their thinking process during the learning activity. Symbols, exercises and instructions

tend to make pseudo easily occur, more over if the instruction of the exercise ask them to find something which directly has formula and the example of its completion. The level of understanding own by the students determine the response of student intellectual towards the problem given. It appears through the discussion that is guide by the lecturer. The act of 1st CycleI proves that TTW model can facilitate the happening of assimilation of accommodation to avoid the occurrence of pseudo.

D. The Conclusion and the Suggestion

Pseudo is one of the most dangerous threats to make the test results not to be an accurate measuring tool for detecting the learners' ability. Therefore, it is necessary to avoid the occurrence of pseudo which of course not only to make test can be an accurate measuring tool, but for the benefit of learning that is more valuable which to achieve the objective of the real learning.

The conclusion of this research is: a) Based on the discussion on the results of the research, it appears that each research subject has a thinking structure that is not exactly the same. The differences in the thinking structure do not hinder every research subject to increase the structure of thinking when the learning takes place. The five subjects of the study have improved both the deeper thinking structure and begin to build the habit to think critically and interpret the material being studied. S_1 is a research subject that has an initial thinking structure that is different from the others, but at the end of cycle, S_1 can have a whole structure of thinking, similar to the achievement of other thinking structures. S_2 has the similarities with S_3, both subjects of this study have a structure of thinking that has been good but not yet intact, while S_4 actually has already have a good structure of thinking but still experiencing discrepancies, so that the initial thinking of structure S_4 require reflection first. In contrast to S_5 even as S_4 requires reflection but in reality S_5 does not have a good thinking skill at the beginning of the study, but finally succeeded to thing intact after receiving treatment. b) Thinking pseudo can be avoided by emphasizing the understanding on each given material. Emphasis on understanding helps the students to understand the material being studied; the understanding makes the students really activate their process of thinking when learning takes place. Symbols, sample of questions and / or study guide make pseudo tendencies become easier to happen. It will be more if the given problem is a command to find something that directly has the formulas and examples of the solution. The level of understanding that they have will determines the students' intellectual response to the given problem. c) The learning model of think, talk and write is proved to avoid pseudo. It is proved at each stage of activity of the model that involve the student activeness in learning, the involvement of thinking about what is being learned is very contributing to avoid pseudo. In addition, the pattern during the study changed the attitude of students in answering questions, the students become accustomed to understanding the meaning of the material that being taught.

Furthermore, the suggestions that can be given in this study are to develop this research for the development of teaching and learning process especially in the field of mathematics. The suggestions that can be given are as follows: a) The main factor that is most influential on the avoidance of pseudo is the understanding of the learners in the material that being studied, therefore the teachers should help the learners to interpret the material being studied. b) The cause of the pseudo is because the learners often to activate their thinking ability, supported by existing models, the learners only imitate and follow the pattern in the existing learning. So that, it is important to enable the learners in thinking when the learning takes place. Asking some challenging questions and making the learners to think are also able to help the learners to avoid the pseudo thinking.

REFERENCES

Alwasilah, Chaedar. 2003. *PokoknyaKualitatif.* Jakarta: PT. DuniaPustaka Jaya denganPusatStudiSunda.
Arikunto, SuhardjonodanSupardi. 2009. *PenelitianTindakanKelas*. Jakarta: PT. BumiAksara.

Bakker. 2004. *Design Research In Statistics Education On Symbolizing And Computer Tools.Disertasi*. Netherlands:FruedhentalInstitut Utrecht.

Chance. 2002. "*Components of Statistical Thinking and Implications for Instruction and Assessment."Journal of Statistics Education.* Vol. 10, No. 3.

Creswell. John W. 2012. *Educational Research; Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. New Jersey: Pearson.

Delmas and Garfield. 1999. "*A Model of Classroom Research in Action: Developing Simulation Activities to Improve Students' Statistical Reasoning*." *Journal of Statistics Education*. Vol. 7, No. 3.

Garfield, Joan, DelMas, Robert, &Zieffler, Andrew. 2010. "*Developing Tertiary- Level Student's Statistical Thinking through The Use of Model-Eliciting Activities* (MEAs)." *Proceedings of Eight International Conference on Teaching Statistics (ICOTS8).* Netherlands: International Statistical Institute.

Gravemeijer, Koeno& Bakker, Arthur. 2006. "*Design Research and Heuristics in Statistiscs Education." Proceedings of Seventh International Conference on Teaching Statistics (ICOTS7).* Netherlands: Utrecht University.

Martadiputra, Bambang, A. P &Suryadi, Didi. 2012. "Peningkatan Kemampuan Berpikir Statistis Mahasiswa S1 melalui Pembelajaran MEAs yang dimodifikasi." *Jurnal Ilmiah Program Studi Matematika STKIP Siliwangi Bandung*. Vol. 1, No. 1.

Miles, Huberman. 1992. *Analisis Data Kualitatif*. Jakarta: Universitas Indonesia.

Murniarti, Novi. 2013. " UpayaMengembangkan Proses Kebiasaan Proses BernalarMahasiswa Papua Melalui Strategi Pembelajaran Kooperatif *Think-Talk-Write (TTW)*dan Penilaian Proses Berbasis Kinerja di Kelas Matrikulasi Matematika STIP Surya." *Tesis.* Jakarta: Universitas Negeri Jakarta.

Nur, Wikandari, danSugiarto. 1998. Teori Pembelajaran Kognitif. Surabaya: Universitas Negeri Surabaya.

Skemp, Richard. 2005. *The Psychology of Learning Mathematics.* Suffolk: The Chaucer Press.

Subanji. 2011. *Teori Berpikir Pseudo Penalaran Kovarisional*. Malang: Universitas Negeri Malang (UM PRESS).

Vinner. 1997. "*The Pseudo-Conceptual and The Pseudo Analytical Thought Processes in Mathematics Learning" Educational Studies in Mathematics an International Journal*. Vol. 34, Issue 2.

Wardani, Wihardit, danNasoetion. 2006. *PenelitianTindakanKelas*. Jakarta: Universitasterbuka.

Zakaria. 2014. "Perbandingan Peningkatan Kemampuan Koneksi Matematis Siswa SMP Antara yang Mendapatkan Pembelajaran dengan Menggunakan Strategi Konflik Kognitif Piaget dan Hasweh." *Tesis.* Bandung: Universitas Pendidikan Indonesia.