THE NEEDS OF CIMAHI AND BANDUNG DISTRICT ELEMENTARY TEACHERS IN CONDUCTING SCIENCE TEACHING

Diana Rochintaniawati
Department of Biology Education FPMIPA UPI
diana_rochintaniawati@upi.edu

Paper Presented in 2nd International Conference on Lesson Study

ABSTRACT

This paper presents result of the first stage of a three-year research project on Development media-based training model. The project aiming at developing training model based on media which in line with teachers need in order to improve elementary school teacher competence in science teaching. In this first stage of research four actions has been conducted, they are: (1) Developing the criteria of science teaching based on study literature, (2) Analyzing teachers need in carrying out science teaching, (3) Developing blue print of based media training model which in line with teachers need and (4) Selecting media which will be used in the training Research method used in the three year project is *Research and Development (R & D).* The first stage of research involves the using of questionnaire and observation. Data collected from the questionnaire shows that 83% teacher claims that teaching is transferring the knowledge while learning is receiving knowledge and activity to get the unknown information. This result indicated that teacher lack of knowledge about nature of science and constructivism in learning. As many as 70% teachers never got involve in science teachers workshop or training. Data collected from observation reveal that teacher in Cimahi and Bandung district need to improve their skill in aspects as follows: 1) Conducting set induction which involve motivate and attract students attention, exploring students prior knowledge as well as stating the aim of instruction; 2) In main activity teacher need to improve their ability to select method which appropriate with the nature of competence that students have to gain, designing and improving the role of media in their instruction as well as developing type and instrument of evaluation. 3) In closure activity teacher need to improve their ability in making conclusion. All teachers have good relationship with student.

Keyword: media-based training model, teacher competency, research and development.
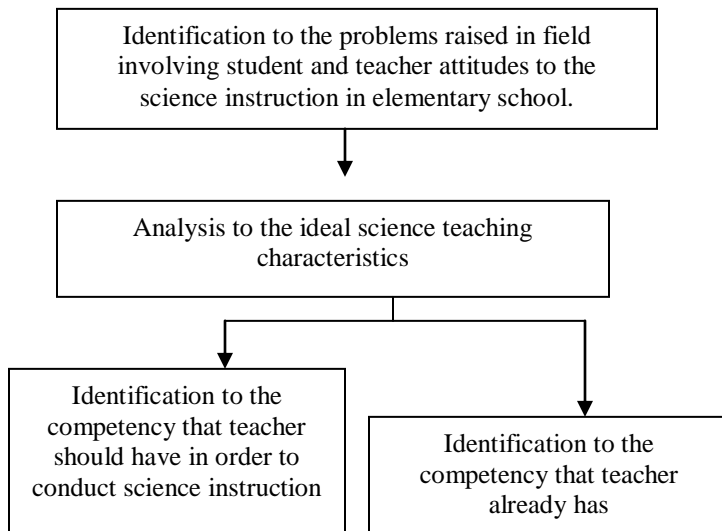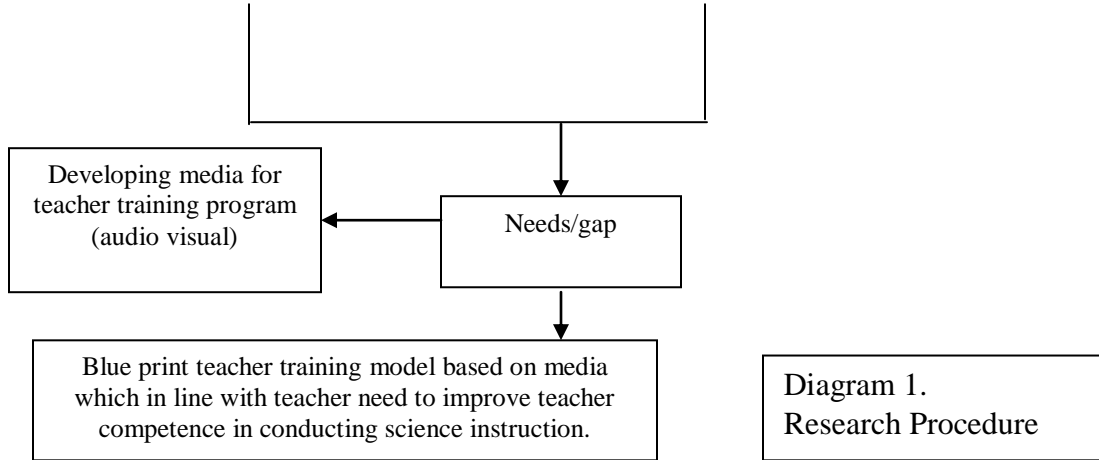
A. Introduction

Teacher plays an important role in teaching learning process. Teacher ability related to the improvement of teaching learning process quality (Widodo, 2006, The Finance Project, 2005), therefore the improvement of teacher competence in conducting science instruction become more important. There have been many efforts developed by the government in order to improve teacher quality. The programs developed in form of in-house training, in-service training, seminar, and workshop. However these efforts have not yet show good result. Widodo (2006) argues there are some reasons that make the government program fail, they are: the program developed did not involve teacher in the development, problem pose in the program is general, mean while teacher problems are specific and contextual, problem that said important by the government is not important for the teacher. Program developed separate the content and pedagogy, innovation given in the program mostly given by lecturing not demonstrating. From those reasons given above Widodo (2006) argues that government program of teacher training did not meet the teacher needs. Similar argument posed by Wentling (1993). Besides that research conducted by National Research Council in 1996, shows that a failure of teacher training program caused by the program developed did not meet the real situation of school. Mostly teacher training program was claim as a simple activity (Wentling, 1993). Contrary, Wentling argues that teacher training program involves important and complex activity that have to be designed in order to meet teacher needs. In order to perform real context of school media in a form of audio visual can be utilized in the teacher training program.

B. Research Method

Method used in the study was *Research and Development (R & D),* which is started with need analysis and ended with model validation. Research involved 23 teachers from 8 schools located in Cimahi and Bandung districts.

This paper is the result of the first phase of the research where criteria of science teaching and teacher competency to conduct science teaching were analyzed based on literature. Teacher performance in conducting science teaching in the real situation was also observed to determine teacher need. The research was also involved the use of questionnaire. Steps of research were drawn in a diagram 1.

```
┌─────────────────────────────────────────┐
│ Identification to the problems raised    │
│ in field involving student and teacher   │
│ attitudes to the science instruction     │
│ in elementary school.                    │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Analysis to the ideal science teaching   │
│ characteristics                          │
└─────────────────────────────────────────┘
          │                      │
          ▼                      ▼
┌──────────────────────┐   ┌──────────────────────┐
│ Identification to the│   │ Identification to the│
│ competency that      │   │ competency that      │
│ teacher should have  │   │ teacher already has  │
│ in order to conduct  │   │                      │
│ science instruction  │   │                      │
└──────────────────────┘   └──────────────────────┘
```

```
                    ┌──────────────┴──────────────┐
                    │                             │
┌─────────────────────────┐              ┌──────────────────┐
│ Developing media for    │ ◄────────────│   Needs/gap      │
│ teacher training program│              │                  │
│ (audio visual)          │              └──────────────────┘
└─────────────────────────┘                       │
                    │                             ▼
┌──────────────────────────────────────┐   ┌──────────────────┐
│ Blue print teacher training model     │   │ Diagram 1.       │
│ based on media which in line with     │   │ Research Procedure│
│ teacher need to improve teacher       │   └──────────────────┘
│ competence in conducting science      │
│ instruction.                          │
└──────────────────────────────────────┘
```

C. Result and Discussion

Based on literature it was reveal that science instruction is characterized by nature of science. In conducting science teaching teacher has to view that science is not only as a product but also as a process, technology and values (Brown, 2002). As a consequence science instruction is not merely memorizing science concept but also giving student skill in doing observation which involved as many as senses student can use, conducting research, using tools, improving thinking skills (scientific thinking skills), investigating, and representing thought inquiry activity. The objective of science instruction in elementary school is giving student comprehension of science phenomenon in a social context by observing environment in order to gain scientific attitude. Teacher act as a partner in teaching learning process who guide student to rake deeper understanding toward science and guiding student to solve problems.

Minimal characteristics that has to be shown in science instruction in elementary school is observation to the real environment closer to the students life both in side of the classroom or out side of the classroom. As a result of this activity, teacher can avoid science teaching instruction which is book oriented (Boyd, 1984; Parkay et, al., 2006).

Based on literature review, NSTA (2003) stated that ideal teacher should has competency as follows: 1) Understand the pedagogy and student behavior, 2) Performing attitude to foster learning and understand human relationship among other 3) Understand science content, 4) Control teaching technical that facilitate student learning 5) Articulate science knowledge and practice science which recently developed , 6) Comprehend nature of science and can involve student effectively in learning the history, philosophy and science practice, 7) Involve student through various method of scientific inquiry as well as active teaching learning process by inquiring. Teacher foster student to get involve individually or in collaborative work in group to observe, ask question, design the inquiry, collect and interpret data which aim to develop concept and its relationship with student experience, 8) Create various student learning which are able to construct the meaning of student experience which related with science and has willingness to explore learning, 9) Planning and application curriculum which has characteristics active and effective, 10) Relate her/his knowledge with local need by

involving stake holder and utilization of personal , institutional resources in her/his instruction, 12) Construct and use effective assessment strategy 13) Organize safe and effective learning environment to foster student learning.

Competences stated above technically grouped into three: content competency which consisted of 1) Living organisms and process of life of human, animal and plant as well as their interaction with the environment and health, 2) Matter, characteristics and its uses: liquid, solid and gas. 3) Energy and its transform: sound, heat, magnet, electricity, light and simple tools. 4) Earth and space: soil, earth, solar system and planets (PERMEN No. 22, 2006:485); content-pedagogy competency and pedagogy competency.

Data gathered from observation reveal that 87% teacher needs to improve their competency in conducting set induction, main activity of instruction and closure. Teacher did not have competency to motivate and exploring student prior knowledge in set induction. This performance indicates that teacher lack of knowledge to the constructivism in teaching (Widodo, 2004). The failure to perform this skill will lead to the failure to develop student thinking framework which causing lose of direction from the teaching that student did (Cooper, 1990: 87). As many as ninety percentage teacher did not inform the objective of their instruction. Breaux (2008) and DeCecco (1990: 87) argue that this performance can cause teacher fail to build student behavior. More than 75% teacher begins their teaching learning process with giving instruction to student to open their book. This performance make student difficult to apply new into new situation (Cooper, 1990) and relate this new information with student thinking structure (Orgil and Bordner, 2004). From 23 samples, only 4 teachers who begin their instruction by using analog or exposing object that has been recognize by student.

In main activity of teaching and learning process, aspects that considered weak were teacher knowledge of science which indicated by the lack of teacher in giving varied example, however only one teacher who has mistake concept and only one teacher who has misconception in her/his teaching. All teachers perform well in their relationship with student.

In pedagogy aspects teacher competency that has to be improved are: giving example close to student life (78%), relates content with student experience (91% guru), use media that will improve students understanding toward science (87% guru) as well as selecting method, model and approach which appropriate with content characteristics (17%). Two teachers who conduct teaching learning process by observing biological object were fail to organize student and foster student to be more get involve with the object. Teaching learning process conducted by 35% teachers could performed affective and psychometric learning dimension where student involved actively collaborate with their friend, share the task, work with minds-on dan hands-on.

In pedagogy aspect, teacher needs to improve their competency in: questioning, 96% teacher tends to pose low level thinking and remembering questions. However 100% teacher gives opportunity to student to ask question. Teacher competence of posing question aim to improve student interaction among each other and between student and the subject learnt was also needed. Teacher tend to dominate teaching learning process with giving question concerning science concept found in book and it rarely related with student life. Other competence that had to improve was teacher ability to select teaching learning method with in line with standard competence and competence base stated in Ministry Regulation No. 22 year 2006 as well as meet with concept characteristics.

Lecturing method was still dominates science instruction. Only 35% from 23 teachers choose group discussion, 9% choose experiment and the rest (70%) choose lecturing in their science instruction.

Teacher improvement in using media was also needed. Although only 17% teacher did not use media in their instruction but most of teacher who use media they tend to choose two dimension drawing. Only 3 teachers who use real object, and they do not perform well in using the real object their instruction. Teacher did not ask student to deeper get involve with the object they bought. This performance will lead student failure to explore knowledge from object that student recognize. Although student use real object in their learning, but when they make conclusion they saw from book. Knowledge dimension developed in instruction mostly to the cognitive aspect. This is not surprising as the questionnaire reveals that: 70% teacher says that the most important in science instruction is memorizing science concept and 78% teacher says that experiment in science instruction is needed in order to understand and memorize the science concept. None of teacher answer that experiment in science teaching is needed to developed psychomotor aspect in learning. This finding shows that teacher lack of understanding to the nature of science, that science instruction in elementary school is not only aiming at understanding science concept but also aiming at improving ability to observe, to inquire, to improve thinking skill (creative and critical thinking skill) as well as empowering science value. This all needed in order to develop student curiosity so they are able to be a self learner (Tisher, 1972; Sukmadinata, 2004; Wortham, 2006). As a consequence of teacher view to science learning, the evaluation type used by teacher was merely to measure low level cognitive aspect gained by student. Teacher never utilizes assessment in the process of teaching learning process.

Another aspect that needed to be improved is closure. In closure, teacher had difficulty to conclude teaching learning process which involved student. However 100% gave test to student as a follow up for their instruction. Type of evaluation given was memorizing to the concept that has been delivered in the instruction. Cooper (1990) argues that this performance causing the affectivity of teacher instruction could be measured.

The competences analyzed in this research make development of teacher training become possible. Many type of teacher training has been offered by expert. Regarding competence can not be built in a short time (Sukmadinata, 2004); teacher training that will be developed in this research is continuous program. The model of teacher training which suitable with the objective of teacher training developed is competency based program which developed based on competence analyzed in this first phase of the research (Wentling, 1993).

The model of teacher training which will be developed involve the intensity of resource (instructor) in the beginning of the program and will be less intensive to the end of the program. The role of instructor will be more directed to assess the program and give feed back to the learners. On contrary, role of learners in the beginning less than the instructor will be more intensive to the end of the program. This kind of activity will make the program meaningful to the learners (Wentling, 1993). Curriculum model that will be utilized in the program is competency curriculum which developed based on technology education. Learning process in curriculum competency is directed to the workable, observable as well as measurable competence and skill.

Blue Print of teacher training design based on analysis on teacher need is drawn in a diagram below.
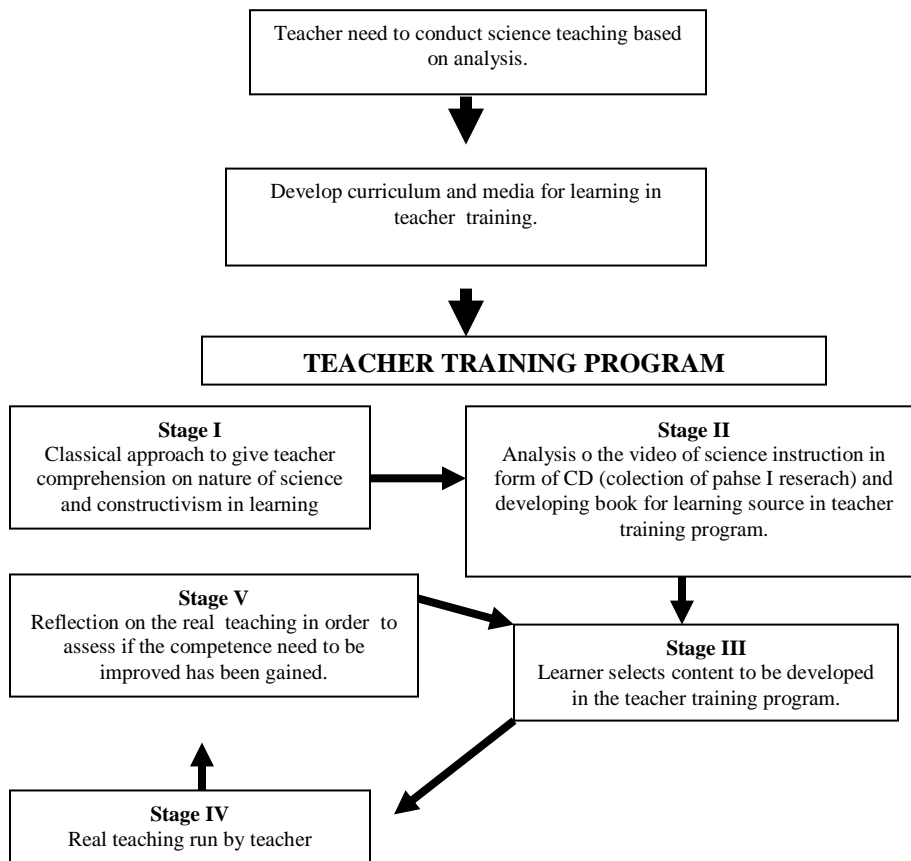
```
┌─────────────────────────────────────────┐
│  Teacher need to conduct science teaching│
│           based on analysis.             │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│  Develop curriculum and media for        │
│      learning in teacher  training.      │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│      TEACHER TRAINING PROGRAM            │
└─────────────────────────────────────────┘
```

Stage I
Classical approach to give teacher comprehension on nature of science and constructivism in learning

→

Stage II
Analysis o the video of science instruction in form of CD (colection of pahse I reserach) and developing book for learning source in teacher training program.

Stage V
Reflection on the real teaching in order to assess if the competence need to be improved has been gained.

Stage III
Learner selects content to be developed in the teacher training program.

Stage IV
Real teaching run by teacher

Diagram 2.   Blue print Teacher Training Model based on media
which in line with teacher need.

D. Conclusion

Based on analysis to data collected in their research, conclusion concluded are: First, science is characterized by nature of science which involved science as process, product, technology and value. As a consequence science instruction should be developed to learn science concept in social context through inquiring involving all senses and scientific method by using tools and scientific thinking as well as investigation, exploration and representation.

Second, teacher who run science instruction should have three dimension of competence, they are: science content, science content-pedagogy and pedagogy in teaching. A competence teacher should be able to: understand science concept which developed based on nature of science, performed science teaching which suitable with student development aspect, have good relationship with their student as a partner of learning, have competence in questioning, have ability to develop student thinking skill, give opportunity for all student to relate with the object they learnt as well as ability to select the assessment.

Third, from questionnaire and observation it was revealed that competence need to be improved by Cimahi and Bandung district teachers are: teacher comprehension to the nature of science and constructivism in learning. In set induction teacher need to improve their ability to motivates student and explore student prior knowledge. In main activity, teacher needs to improve their ability to select method which in line with competence standard and basic competency of student, select media and assessment. In closure, teacher needs to develop competence in summarizing lesson involving student. Teacher relationship with student is the best aspect they have.

E. REFFERENCES

Breaux, Robert. 2008. Effects of induction versus deduction and discovery versus utilization on transfer of information. *Journal of Educational Summer 2008.* on-line on http://psycnet.apa.org/index.cfm?fa=main.doiLanding&uid=1976-06136-001

Brown, J.S. 2002. Situated Cognition and The Culture of Learning. *Educational Researchers 18:32-41.*

Boyd, John. 1984. *Understanding The Primary Curriculum.* Hutchinson and Co. Publisher. Ltd: Johannesburg

Cooper, James, M. 1990. *Classroom Teaching Skills, Fourth Edition.* Toronto: D.C. Heath And Company.

DeCecco, John P. 1990. The *Psychology Of Learning And Instruction: Educational Psychology.* New York: Prentice Hall.

Orgill MaryKay & Bodner George. 2004. What Research Tells Us about Using analogies to Teach Chemistry. *Chemistry Education Research and Practice Vo. 5 No. 1 pp. 15-32.* on-line on http://www.uoi.gr/cerp/2004_February/pdf/04Bodner.pdf. access date 29 October 2008.

Parkay, Forrest; Anctill, Eric & Hass, Glen. 2006. *Curriculum Planning: A Contemporary Approach.* USA: Pearson Education Inc.

Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 22 Tentang Standar Isi Untuk Satuan Pendidikan Dasar Dan Menengah.

Sato, Manabu. 2006. *Tantangan Yang Harus Dihadapi Sekolah*. Makalah disajikan dalam Seminar Nasional IPA di FPMIPA UPI.

Sukmadinata, N.S. 2004. *Pengembangan Kurikulum: teori dan praktek*. Bandung: CV. Rosda Karya

Tisher, R.P. 1972. *Fundamental Issues In Science Education*. John Willey: Adlai

Widodo, A. 2004. Students' and Teacher's Questioning in Primary Science. Thesis Master, Deakin University Australia.

Widodo, Riandi, Ana, Amprasto. 2006. *Analisis Dampak Program-Program Peningkatan Profesionalisme Guru Sainsd Terhadap Peningkatan Kualitas Pembelajaran Sains di Sekolah*. Laporan Penelitian Hibah Kebijakan. Tidak diterbitkan.

Wentling, Tim. 1993. *Planning For Effective Training: A guide to Curriculum Development*. Roma: Food and Agriculture Organization of The United Nations