Conceptual Change Model Training as an Effort to Remediate Misconceptions, Improve Concept Understanding, and Learning Achievement on Electric Current Materials

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Abstract. Batuan Village is located in Sukawati District, Gianyar Regency, Bali Province. Batuan Village in general is a low area stretching from north to south with an area of +410 ha. According to the statistical data above, it can be concluded that, topographically, Batuan Village is an agricultural area. Currently, the government is intensively making efforts to improve the quality of education. One of the efforts that the government has made is to re-fine the curriculum that applies in the world of education. The implication is that the Education Unit Level Curriculum (KTSP) has also been developed and implemented as a refinement of the KBK. The aim is to ensure the achievement of national education goals by 2007. Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System and Government Regulation of the Republic of Indonesia number 19 of 2005 concerning National Education Standards mandate that the KTSP curriculum for primary and secondary education levels be prepared by units education by referring to Content Standards (SI) and Graduate Competency Standard's. The conception of learning is a manifestation of a person's interpretation of an object that is being observed and often appears in students' cognition before the formal learning process takes place (Santyasa, 2004a). Conceptions of learning can be divided into two groups, namely a) preconceptions are conceptions based on formal experiences in everyday life, and b) misconceptions are errors in understanding concepts caused by previous learning. Misconceptions or wrong concepts are concepts that are not in accordance with scientific understanding or understanding accepted by scientists in the field concerned (Cakir, 2008; Champagne in Rebich & Gautier, 2005; Suastra, 2000; Subratha & Kariasa, 2001). Misconceptions can take the form of conceptual errors, incorrect relationships between concepts and intuitive ideas or naive views (Suparno, 2005). Another definition, Novak (in Suparno, 2005) states that misconceptions are interpretations of concepts in a statement that are unacceptable. Furthermore, Brown (in Suparno, 2005) views misconceptions as a naive view and defines misconceptions as ideas that are not in accordance with scientific conceptions. Baser (2006c) added that misconceptions or alternative concepts arise from initial experiences and wrong interpretations of existing information, in the form of naive understandings that do not match the views of experts. This Community Partnership Program will be implemented with partners, namely the Elementary School Teachers Group 1 Batuan, Gianyar Regency, Bali, Batuan Village, Sukawati District, Gianyar Regency, Bali Province and will start when the PKM proposal has been approved.

Keywords: education; MPK model; science education.

1. Introduction

Batuan Village is located in Sukawati District, Gianyar Regency, Bali Province. Batuan Village in general is a low area stretching from north to south with an area of +410 ha. According to the statistical data above, it can be concluded that, topographically, Batuan Village is an agricultural area. Apart from that, administratively Batuan Village is divided into 17 service hamlets/hamlets. The boundaries of the Batuan Village area are: North: Batuan Kaler Village, South: Sukawati Village, West: Central Singapadu Village, East: Kemenuh Village [1]. In order to prioritize community empowerment in Batuan Village, Sukawati District, Gianyar Regency, especially in Br. Lantangidung is the main focus in the food sector. Maintaining processed food is the duty and responsibility of all parties in maintaining local wisdom in the food sector.

Education functions to create changes towards a more innovative life (Suastra et al., 2005). Education is not only a tool used to develop knowledge in schools, but is also used as an aspect of education. One aspect of education used in the current era of globalization is PAIKEM learning. PAIKEM stands for Active, Innovative, Creative, Effective and Fun Learning. According to Minister of National Education Regulation No. 41 of 2007 concerning process standards, it is also mandated that core learning activities must be carried out in an interactive, inspiring, fun, challenging manner, motivating students to participate actively, and providing sufficient space for creativity and independence in accordance with talents, interests and development. physical and psychological of students.

One of the groups of science subjects closest to natural phenomena and empirical formulas is natural sciences. In line with this, Santyasa (2004b) stated that learning science. involves the ability and skills of physical interpretation, transformation of quantities and units, mathematical logic and accurate numeracy skills. Apart from that, the objectives of science learning. not only provides opportunities for students to learn about established facts and theories, but also develops scientific habits and attitudes to discover and renew reasoning abilities in constructing understanding (Santyasa, 2004a). The implication is that in learning science. it is not enough for students to understand and master the concept. However, students must be able to develop their own knowledge so as to create a deep understanding of concepts.

Various studies that lead to increased efficiency, effectiveness of services and development as a consequence of educational innovation have been carried out in curriculum implementation (Mulyasa, 2006). Science education is one aspect of education, using science as a tool to achieve the goals of science education in particular (Suastra, 2009). Science is a dynamic science, not static, both in principle and in practice as long as people can continue to observe and use scientific methods. Science as a branch of science (IPA) has a strategic role in the development of science and technology today. According to Santyasa (2006), education is to prepare the young generation to not only obtain data, information and knowledge, but what is more important is to construct understanding, grow insight and develop wisdom.

Due to the problems faced by science teachers at SD Negeri 1 Batuan, Gianyar Regency, Bali, they asked the Vocational School, Telecommunications Technology Study Program and Faculty of Agriculture, Food Science and Technology Study Program, Warmadewa University to provide training at SD Negeri 1 Batuan. Gianyar Regency, Bali. The partner problems that need to be addressed:

1). Partners do not yet understand the Conceptual Change Learning Model.

2). Partners have not shown understanding of concepts and learning achievements, especially in the Electric Current material provided.

3). Partners do not yet have a good understanding and awareness of the importance of the Conceptual Change Learning model.

4). Partners complained about the Conceptual Change Learning Model taught previously.

2. Problem Solution

1Conceptual Change Learning (MPK) is a component related to connecting context and finding meaning from problems that occur in everyday life, then together we can solve problems, design a plan, reach a decision and conclude. So that each component can give and receive, ask and answer the required context.

2Conceptual Change Learning (MPK), in increasing the understanding of science concepts in Electric Current material carried out by students, so that Conceptual Change Learning (MPK), can provide opportunities and opportunities to complement each other and provide more intense and concentrated individual attention.

Conceptual Change Learning (MPK), by encouraging academic potential, career skills, developing student character with a strategy of connecting tasks with personal experience and knowledge in the learning process.

3. Activity Results

The implications of this MPK Model are First, students before participating in the learning process already have initial knowledge which of course is different for each individual. In this condition, students tend to maintain their initial conception and find it difficult to make changes. If the initial conception is in line with the scientific conception, then an assimilation process will occur in students, namely strengthening each other's concepts so that existing concepts become stronger. The way to change alternative conceptions into scientific conceptions is to provide new concepts to students through the process of dissatisfaction, intellingible, plausible, and fruitful. Second, the new conception must fulfill four conditions in order to be able to inspire students who still have misconceptions, namely 1) dissatisfication, 2) intelligible, 3) plausible, and 4) fruitful. If a student is able to pass these four stages, it is said that the student has experienced the accommodation process. The new conception must be able to foster motivation for students that the initial misconception is not appropriate for explaining a concept being studied so that students become dissatisfied with the initial conception they have. Third, the new conception must be clear, easy to understand (intelligible) and meaningful (meaningful) for students. After students experience dissatisfication of their conceptions, they will experience disequilibrium. In this condition, students will be willing to change their initial conception if the new conception has a strong and trustworthy alibi. Fourth, students must find that the new concept presented must make sense (plausible) and be in accordance with the facts (truthful) so that in the student's cognitive structure beliefs emerge regarding the new concept. Therefore, the new concept presented must be consistent and related to other concepts in explaining a phenomenon

that occurs so that it appears reasonable. Fifth, students must be sure that the new concepts being studied are useful (fruitful). The new concept must actually be able to solve problems faced by students that cannot be solved by the old concept so that students increasingly feel the usefulness of the new concept.

Students' conceptions are always different from those of physicists. Physicists' conceptions are generally more complex, more complicated, involving more relationships between concepts than students'. If the student's conception is the same as the physicist's simplified conception, then the student's conception cannot be called wrong, but if the student's conception contradicts the physicist's conception it is said to be a misconception. Students' conceptions are built through an informal process of understanding everyday experiences which is called prior knowledge or preconceptions (Cakir, 2008). Of course, in understanding something, each child (student) has a different initial conception in responding to something which may still be labeled a misconception or which is already scientific (Küçük et al., 2005). So, it is clear that the occurrence of misconceptions in students is a normal thing in the process of forming knowledge by someone who is in the learning stage.

One of the constructivist-based learning models is the Conceptual Change Learning Model (Trianto, 2007; Santyasa, 2007). The conceptual change model was first proposed by Posner, Strike, Hewson, and Gertzog in 1982 at Cornell University. They describe learning as a mental process in which students can change their conceptions by increasing their knowledge with new concepts or changing their initial conceptions into scientific conceptions (Cakir, 2008). Apart from that, Posner et al (Dole & Sinatra, 1998) developed the conceptual change model (CCM) to explain why many students maintain their conceptions regardless of the instructions given and what conditions must be given to students so that they are willing to change their existing conceptions. Wrong. Another definition states that conceptual change theory is a model to bridge the gap between everyday knowledge and scientifically correct concepts (Luera et al, 2005).Miskonsepsi yang terjadi pada siswa bisa bermacam-macam sesuai dengan sumber-sumber miskonsepsi. Hasil penelitian Sadia (2004) mengungkap bahwa miskonsepsi pada siswa bisa terjadi karena kesalahan pada proses pembelajaran sebelumnya dan terus dibawa oleh siswa. Selain itu, miskonsepsi terjadi tanpa memandang perbedaan usia pebelajar, walaupun pebelajar memiliki umur yang berbeda, akan tetapi cenderung mempunyai kesamaan miskonsepsi terhadap topik-topik yang ilmiah (Balci, 2004). Selanjutnya, Suparno (2005) mengemukakan ada lima faktor yang menyebabkan terjadinya miskonsepsi pada siswa, yaitu siswa, guru, buku teks, konteks, dan metode mengajar.

In line with the above, Dole & Sinatra stated that conceptual change focuses more on the three aspects studied, namely 1) a person's cognitive factors that will influence the occurrence of conceptual change, 2) the development of student knowledge, and 3) design/methods and strategies applied in speed up the process (Lee et al, 2006). Therefore, in each student's mind there is a cognitive structure that is different from one student to another. Pines (in Cakir, 2008) states that cognitive is the mind, the power to know, awareness, concepts, focus on one's knowledge. Therefore, cognitive structure places more emphasis on a person's concepts, cognition, understanding and ideas about something. Novak (in Cakir, 2008) suggests that a concept is a unity of meaning that is formed from memory and mental representations that are manifested in words.

Before participating in the learning process in class, every student already has an initial conception of a phenomenon (Baser, 2006a). Conception is a mental representation of the characteristics of the external world or theoretical domains. Conception is a manifestation of a

person's interpretation of an object he observes which often or always appears before learning. For this reason, as a teacher it is your obligation to want to activate the initial knowledge you have. MPPK is a learning model that is able to present cognitive conflict strategies in an effort to reactivate students' initial knowledge. As a result, students will experience conceptual changes in order to achieve a deep understanding of concepts. Conceptual changes will occur if in learning, teachers pay attention to students' prior knowledge as a starting point in achieving learning goals (Santyasa, 2004b). Piaget (in Kattoula, 2008) stated that two things will happen in students' cognitive structures during the learning process. First, in the student's cognitive structure, an assimilation process will occur if the new conception given is in line with the initial conception they have. Second, if the initial conception is not in line with the new conception that has been learned, an accommodation process will occur. In this condition, a process of conceptual change is needed. In line with this, Posner et al (in Cakir, 2008) stated that when students want to change their knowledge, they will find three things, namely assimilation, accommodation and disequilibration. These three things are the initial steps for the process of conceptual change for students' conceptions which are still labeled as misconceptions towards scientific conceptions. Assimilation is a process of combining new concepts with existing concepts in students' cognitive structures so that old concepts become stronger in their existence and become scientific conceptions (Dahar, 1989; Suparno, 2005).

Meanwhile, accommodation is a process of conceptual change because the initial conception that students already have does not match the concept they have just learned. As a result, it will give rise to cognitive conflicts within students so that conceptual change strategies are needed to facilitate this process (Posner et al, in Cakir, 2008). Disequilibration can occur when students' expectations do not match the conceptions they already have. For this reason, instructions will continue to be carried out to improve the existing concepts. If during this process, only assimilation occurs, then there will be no process of disequilibration or conceptual change. If an accommodation process occurs, students will be faced with a process of conceptual change. In fact, knowledge reconstruction through accommodation occurs more often than assimilation. This is because students still have a lot of initial knowledge labeled as misconceptions (Suparno, 2005). Partner's contribution to the implementation of the MPK Model is being able to apply the PAKEM method, where PAKEM stands for Active, Creative, Effective and Fun Learning. PAKEM is a learning model implemented in a refined curriculum under the guidance of MBE (managing based of education) from UNESCO, which in its application is learning that develops critical, creative and problem-solving abilities. The PAKEM method is one of the desired learning models in implementing KTSP in the classroom. This is based on the fact that PAKEM is one of the pillars of building KTSP apart from school management and PSM (community participation). PAKEM is also a learning approach that allows students to carry out various activities to develop skills, attitudes and understanding with an emphasis on learning by doing, while teachers use various resources and learning aids including the use of the environment to make learning more interesting, enjoyable and effective. By applying this learning model, Partner's contribution to active learning that can be of interest to students, especially the active learning model is closely related to learning motivation because there is a reciprocal relationship between the two things; for active learning requires strong learning motivation; On the other hand, active learning will cause learning activities to be more successful and enjoyable so that it can increase learning motivation. With increased learning motivation, students can make positive decisions. According to Mulyasa, active learning is a learning approach that involves more student activities in accessing various information and knowledge to be discussed and studied in the learning process in class, so that they gain various experiences that can increase their understanding and competence. This is

implemented in the form of the PAKEM approach to learning. In this learning, the teacher positions himself more as a learning facilitator who regulates the circulation and course of learning by first conveying the goals and competencies to be achieved in a lesson. Meanwhile, students are actively involved and play many roles in the learning process. As a learning center, students must be more active in activities to build certain understanding, skills and attitudes/behavior. Student activity is important because learning is essentially an active process where students use their minds to build understanding (constructivism approach). The active learning process will cause students to be able to think innovatively and creatively.

Making learning creative, creative learning is a learning process that requires teachers to be able to motivate and bring out students' creativity during learning, using several varied methods and strategies, for example group work, role playing, and problem solving. For this reason, teachers are required to be able to stimulate students' creativity in terms of thinking skills and in carrying out actions. Learning can be said to be effective if it is able to provide new experiences, and shape students' competencies, and lead them to the goals they want to achieve optimally. This can be achieved by involving all students in planning the learning process. Effective learning requires active involvement of students, because they are the center of learning activities and competency formation. This learning also needs to be supported by an adequate atmosphere and environment. For this reason, teachers must be able to manage the learning place well, manage students, manage learning activities, manage learning content/materials, and manage learning resources.

4. Partner Contribution To Implementation

This Community Partnership Program will be implemented in partners, namely the Teacher Group of SD Negeri 1 Batuan, Gianyar Regency, Bali, Batuan Village, Sukawati District, Gianyar Regency, Bali Province and will start when the PKM proposal has been approved, where in this school MPK Model training will be provided. .

Based on the problems described above, the solutions and follow-up actions are as follows:

a. Partners are expected to comply with all agreements and carry out all series of activities with full discipline until all series of PkM activities end.

b. Partners who are training participants are expected to comply with all agreements that have been made in accordance with the statement of willingness to collaborate in this PKM activity.

c. After the PKM activity ends, partners are expected to be able to continue their business well and put into practice the improved technology package and the business they started can develop.

5. Conclusions

The delivery of the Conceptual Change Learning Model which emphasizes the process of student involvement in finding material, namely the learning process in the context of Conceptual Change Learning does not expect students to only receive learning material, but rather the process of searching and finding their own knowledge.

Understanding the Conceptual Change Learning Model (MPK) training encourages students to be able to find connections between the material being studied and real life situations, meaning that students are required to be able to grasp the relationship between learning experiences and real life. This is very important, because by being able to connect the material found with real life, the material will be firmly embedded in students' memories, so it will not be easily forgotten.

Understanding Conceptual Change Learning (MPK) to encourage students to be able to apply it in life, meaning that Conceptual Change Learning (MPK) not only expects students to be able to understand the material they are studying, but also how the learning material can color their behavior in everyday life. The lesson material in the context of Conceptual Change Learning (MPK) is not to be stored in the mind and then forgotten, but as a provision for them in navigating real life.

This learning model aims to ensure that learning is not just about memorizing but requires understanding. This learning model emphasizes developing students' interests in experiences.

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