IMPLEMENTATION OF CONSTRUCTIVIST APPROACH AMONG CHEMISTRY STUDENT TEACHERS IN TEACHING CHEMISTRY DURING THEIR TEACHING PRACTICES

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IMPLEMENTATION OF CONSTRUCTIVIST APPROACH AMONG CHEMISTRY STUDENT TEACHERS IN TEACHING CHEMISTRY DURING THEIR TEACHING PRACTICES

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A report submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Science with Education (Chemistry)

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APRIL 2010
I declare that this thesis entitled “Implementation of Constructivist Approach among Chemistry Student Teachers in Teaching Chemistry during Their Teaching Practices” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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DEDICATION

To my beloved father, mother, brothers and dearest sister
This thesis is developed under supervision of Dr. Ahmad Johari Bin Sihes. At this time, I would like to express my deeply appreciation to Dr. Johari for his guidance, patience, critics and friendship throughout the implementation of this thesis. Besides, I am very thankful to En. Meor Ibrahim Kamaruddin, for taking time to check and verify my research instrument.

Last but not least, I would like to thank my family for their support and motivation both in spirit and financial.
ABSTRACT

The purpose of this study is to investigate the implementation of constructivist approach among chemistry student teachers in teaching chemistry during their teaching practices. In order to fulfill the purpose of this study, six research questions were developed. First, “What is the student teachers’ understanding about constructivist approach?” Second, “What is the usage percentage of constructivist approach among student teachers during their teaching practices?” Third, “What are the factors that influence student teachers to use constructivist approach during their teaching practices?” Fourth, “What are the obstacles faced by student teachers in implementing constructivist approach during their teaching practices?” Fifth, “What are the solutions for the obstacles faced by student teachers in implementing constructivist approach during their teaching practices?” Sixth, “What are the measures that can be taken to enhance the usage of constructivist approach?” A total of seventy chemistry student teachers from Faculty of Education, UTM were chosen as the respondents in this study. A questionnaire was constructed according to the research objectives for data collection. Findings from this study reveal that majority of the chemistry student teachers have good understanding about constructivist approach but the usage of this approach in their teaching is very low. Results also reveal that microteaching class is the major factor influencing student teachers to implement constructivist approach in their teaching. However, the main obstacle in implementing constructivist approach is time insufficiency, and thus requires the concern of faculty. To enhance the usage of constructivist approach, alternative assessment is suggested by majority of the student teachers as the best practice.
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1.1 Introduction

Constructivism, progressivism and behaviorism are famous learning theories in the fields of psychology and education. Constructivism is about how the brain constructs knowledge, progressivism views that knowledge should be learned from real-life situations and behaviorism describes learning as a change in one’s behaviour (Hammett, 2005). Both constructivist approach and progressivist approach view students as responsible for what they learn, while behaviorist approach argues that the most efficient and reliable method of changing one’s behavior to reflect learning is by directly giving students all information they should learn and test their behavioral outcomes (Travers, 1978).

Traditionally, majority of the teaching practices have their roots in behaviorism (Fosnot and Perry, 2005). That is, teachers decide what students should learn and directly expose knowledge to them. Students’ understandings are then tested by using a series of standardized public examinations. However, this lecture-based teaching practice has shown significant limitations. On the whole, reading and audiovisual are considered as the most important learning modes in this teaching practice, but not all students can learn effectively from reading. Some students may still loss in the material or lose interest in the presentation even though visual and audio stimuli in lecture are utilized.
Recently, constructivism is gaining popularity and has become a dominant perspective in science education (Taber, 2007). In this approach, students learn based on four principles – Learners construct their own meaning, new learning builds on prior knowledge, learning develops through “authentic” task and learning is enhanced by social interaction. Lorsbach and Tobin (1992) asserted that students in constructivist approach are given ample of time and opportunities to explore their learning. They compare their prior experiences to new knowledge and at the same time, resolve the discrepancies between what is known and what is implied by the new experience. In other words, constructivist approach encourages students to understand what they have learnt and use their understanding (e.g. in science) to enjoy the natural world in which they live.

Many studies have shown that teachers in Malaysia rarely implement constructivist approach in their teaching. This is supported by the findings of this study which reveal that, the usage percentage of constructivist approach among chemistry student teachers during their teaching practice is quite low. Majority of the respondents are in the category of “Sometimes” (41-60%). Their reluctance to use constructivist approach may due to stress, insufficiency of time and teaching materials, difficulty in controlling class, social problems and others. Thus, the purpose of this study is to give a systematic analysis on the implementation of constructivist approach among chemistry student teachers in teaching chemistry during their teaching practices.

1.2 Background of the Study

Studies by Piaget and others since 1970s have led to constructivist philosophy, which focuses on the framework that students’ participation are carried into learning situations (Schulte, 1996). Constructivist theory encourages students actively construct knowledge by solving realistic problems. In collaboration with others, students use active techniques such as experiments and problem solving to build more knowledge.
Chemistry/science teachers with conventional wisdom hold a traditional belief that teaching is just a kind of knowledge transmission. The main roles of teachers are to keep students under control and correct them so that learning will take place (Bijas, 2007). Furthermore, the pressure of high-stakes testing influences most teachers to implement a curriculum to ensure their students cover all relevant science contents, expecting their students will learn more when they teach more (Schoenfeld, 1988).

Regrettably, their expectations do not work and even disappointed by students’ poor academic results. Most students show no interest on chemistry subject and claim that chemistry is abstract and hard to be understood. Besides, there are significant research studies in science showing that students already have their own alternative conceptions which could influence the learning processes in their minds (Tytler, 2002). These alternative conceptions are strongly held by students and resistant to change (Treagust, Duit and Fraser, 1996).

Based on research study on “An Inventory for Alternate Conceptions among First-Semester General Chemistry Students” by Mulford and Robinson (2002), they found that one of the students’ alternate conceptions in chemistry on conservation of mass, molecules, and atoms during a chemical reaction is “the total number of molecules is also conserved in a chemical reaction”. It can be seen that students often construct meaning that fit their experiences and expectations which sometimes differ from the scientific view. To resolve this cognitive conflict, students often separate school science from their own life experiences. Consequently, chemistry is a hard subject in students’ eyes and this makes them lose interest on this subject.

In Malaysia, chemistry taught in classroom is usually done based on behaviorist approach. In a normal setting, students will sit in a way where all will face the teacher in an almost passive way. Students are trained to listen, to write and to comprehend what is being taught. Activity of assessing students’ understanding during the ongoing teaching session for problem identification and remedying problems is very rare (Jantan, 2003). Skills of conducting experiments in lab are not emphasized. As a result, students produced are good in memorization but may not
think creatively and resourcefully. It has a potential effect on the economy of Malaysia because employers in the economy industry only value people who can think logically and creatively.

Apart from parents, teachers are often regarded as the single most important facet in students’ education (McCarthy, 1972). Hence, student teachers nowadays are trained to understand students’ learning styles and learn to create conducive environment for their students. They are encouraged to implement constructivist approach which is believed able to overcome the challenges of teaching in secondary school today, notably students with wide variety experiences, prior knowledge, and goals. However, most student teachers find it difficult to implement this approach during their teaching practices. Despite the fact that they have no teaching experience, they are under pressure to deliver the entire syllabus prescribed by Ministry of Education. Furthermore, some chapters in chemistry are too abstract (e.g. Structure of an Atom and Chemical Bonds) and this force the teachers to narrow the content and “just teach for test”. Therefore, implementation of constructivist approach among chemistry student teachers in their teaching is investigated in this study.

1.3 Statement of the Problem

Research has shown that chemistry teaching is unpopular and irrelevant in the eyes of students (Krajcik, Mamlok and Hug, 2001). Most students in Malaysia view the science they learn from school is just the knowledge reside in book and is only used for test. This is because most chemistry teacher rarely relates theories to applications. Besides, the traditional teaching approach in Malaysia rarely motivate students actively participate in the learning process. A teaching session usually ends with the teacher having completed his/her role of imparting knowledge without assessing how much learning actually took place (Jantan, 2003). Malaysian culture also does not usually perpetuate answering or asking questions among the students,
seldom do students engage in intellectual exchange ideas in or outside the classroom (Jantan, 2003).

Malaysia student teachers are usually exposed with various teaching approaches before they go for their teaching practices. This can essentially help them to get prepare to teach students with different backgrounds and experiences. Jantan (2003) found that students process information more efficiently when they are actively involved in the learning process. Hence, constructivist approach is advocated as the best way to educate majority of the students.

However, the stress of high-stakes testing and pressure in increasing students’ scores in test force most chemistry student teachers to abandon their teaching intuition and creative instructional strategies during their teaching practices. Instead of using constructivist approach, they tend to shift to lecture format, expecting their students learn a large amount of material in a short time and perform well in exam. In addition, Oliver-Hoya et al. (2004) and Llewellyn (2005) argued that student-centered learning is a slower process, and thus, the same amount of material cannot be covered in the same amount of time. Therefore, this study attempts to investigate the implementation of constructivist teaching approach among chemistry student teachers during their teaching practices.

1.4 Research Objectives

The following are the objectives of this study:

1. To study student teachers’ understanding about constructivist approach.
2. To study the usage of constructivist approach among student teachers during their teaching practices.
3. To study the factors that influence student teachers to use constructivist approach during their teaching practices.
4. To investigate the obstacles faced by student teachers in implementing constructivist approach during their teaching practices.
5. To investigate the solutions for the obstacles faced by student teachers in implementing constructivist approach during their teaching practices.
6. To investigate the measures that can be taken to enhance the usage of constructivist approach.

1.5 Research Questions

In fulfilling the purpose of this study, the following research questions were posted.

1. What is the student teachers’ understanding about constructivist approach?
2. What is the usage percentage of constructivist approach among student teachers during their teaching practices?
3. What are the factors that influence student teachers to use constructivist approach during their teaching practices?
4. What are the obstacles faced by student teachers in implementing constructivist approach during their teaching practices?
5. What are the solutions for the obstacles faced by student teachers in implementing constructivist approach during their teaching practices?
6. What are the measures that can be taken to enhance the usage of constructivist approach?