



## Pedagogical Practices of Design and Technology (RBT) Teacher Trainees

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### ABSTRACT

This study aims to identify the pedagogical practices of the teacher trainees of Design and Technology option in conducting lessons in mock teaching practice in order for the trainees to become excellent teachers. In addition, this study aims to see whether there is a relationship between the trainee teachers' perceptions to the mock teaching practices experienced during teaching in schools. The samples of this study are 81 teacher trainees taking Design and Technology option of Institut Pendidikan Guru Kampus Tun Hussein Onn, Batu Pahat, Johor January 2010 intake. The study was conducted through a quantitative approach using questionnaires. The results showed that the level of the teacher trainees' pedagogical practices is medium in the teaching and learning process. The results also indicated positive perceptions of trainee teachers toward the third phase mock teaching practice gives a very good exposure.

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### Introduction

Teachers play a vital role in teaching students. In class, teachers are an educator or a facilitator. A good teacher will make the student understand a concept or a skill easier, and a bad teacher will only make the student struggle harder to comprehend the concept or skill. It will also cause the lesson to be dull and boring, the students unable to pay attention and even worse, they will not want to enter the class. An effective teaching and learning practice is when the teacher varies his teaching method, prepares his teaching aids and studies the lessons that he will be teaching beforehand. Coinciding with Shulman (1986), he emphasized that the basic knowledge for teachers' education is focused on the knowledge of his or her subject contents. He explained that the mastery of teachers in their subject content and their ability to change it into pedagogical forms will be an advantage for the teacher in carrying out teaching and learning process in the classroom. The pedagogical forms are choosing strategies and teaching methodology for the teaching and learning process, to capture the students' interest so that they follow the lessons that will be taught.

Besides that, teachers should also know the students' ability to absorb the lessons, motivate the students to study hard, control their behavior and attitude during the process of teaching and learning, categorize the students based on their level and lastly give evaluation to the students. In other words, an effective teaching and learning process is due to the teacher's ability to turn lessons into suitable pedagogical forms, helping him to deliver the lessons better and motivating the students to keep studying to achieve excellence and ultimately triumph in the academic field.

Slavin (1987, 1995) had built an effective new teaching model, which focuses on 4 factors that lead to excellent teaching; *quality of instruction, appropriate level of instruction, incentive and time.*

Quality of instruction is the ability for the teacher to make the lessons, concept or skills easier for the students to understand and memorize and also fun to learn. Teachers need to deliver the lessons accordingly and systematically, using

simple and easy instruction (Land,1987), clear explanation and relevant examples, emphasizing main points of the lesson, relating the new lesson with the previous one and use teaching aids to explain new concepts to the students (Taber, 2007). Furthermore, learning objectives must be clear and specific, subject content must be sufficient and at the end of the lesson, teachers have to give an assessment or test to the students.

Appropriate level of instruction is the suitability of the lesson to the students' ability and strength. If the level of instruction is high, weak students will not be able to catch up and lastly they will be left out in his studies. If the level is too low, intelligent students will not be paying attention to the lesson taught by the teacher. This will waste their time as the teacher has to pay attention to the weaker students. One way to solve this problem is by grouping intelligent students in one group and the weaker ones in the other, based on their ability and mastery of certain skill. Teachers can also carry out individual teaching (Slavin,1989) though it did not show positive impact on the student's achievement (Hartley,1977; Horak,1981). One way to achieve an effective teaching and learning process is through cooperative learning group that group the intelligent student with the weaker ones so that the intelligent student can help the other students in his group. With this, the teacher will be able to teach and pay full attention to his lesson.

Incentive is the ability for teacher to give motivation to the students to continue studying and complete the tasks given. There are two ways to motivate students to continue studying (Slavin,1995). First, the teacher must prepare an eye-catching and exhilarating lessons for the students by varying teaching methods and teaching aids. Secondly, the teacher can give incentive to the students by giving the rewards or compliments to those who have mastered the lesson or by giving small punishment to those who do not.

Teaching and learning time is the sufficient time for the students to learn a concept or skill. Usually, a lesson is affected by two factors; time allocated by the school to the teachers, *time-on-task* or *engaged time* which is the time used by the teachers to teach and the students to learn to acquire new

knowledge or skills. A research by The Beginning Teacher Evaluation Study (1998) shows that time allocated to a certain subject do not give impact to the students' achievement when it is measured in class level (Marliave, Fisher dan Dishaw, 1978). A research on engaged time or time-on-task shows that there is a significant relationship to the students' achievement in the academic field.

### Research Objective

Objective of this research is to determine the pedagogical practices of Design and Technology teacher trainees when carrying out activities during mock teaching. Furthermore, this research is carried out to see the teacher trainees' perception towards the mock teaching practices they have undergone in several schools in Batu Pahat.

### Research Question

To achieve the objective of the research, these questions is asked, that is :

1. What are the pedagogical practices of Design and Technology teacher trainees during the third phase of mock teaching practice.
2. What are the perceptions of the teacher trainees of Design and Technology towards the third phase mock teaching?

### Literature Review

Teachers play an important role in determining the effectiveness of curriculum changes in school. Teachers can determine and shape how curriculum changes can be carried out in their class; choosing the right material, teaching strategies, preparing activities and also teaching skills (Habib Mat Som, 2007). Thus, to produce an effective teaching and learning practice in class, teachers have to master the subject so that the students can understand clearly what is taught by the teacher.

Shulman (1986) states that the basic knowledge for teachers focused on their knowledge of their subject content. He had developed a new frame for teacher education by introducing *pedagogical content knowledge-PCK*. It was developed in the project "*Knowledge Growth in Teaching*" as a wider perceltive model to understand the process of teaching and learning. This project research how the new understanding affects their teaching methods.

*"Pedagogical content knowledge is a unique knowledge for a teacher and it is based on the teacher's method in relating his pedagogical knowledge to his subject content knowledge. The integration of both knowledge is the pedagogical content knowledge (PCK)."*

(Shulman, 1987: 15)

According to Shulman (1987), pedagogical content knowledge is one of the seven basic knowledge that must be mastered by any educator. The seven basic knowledge are (i) subject content knowledge, (ii) general pedagogy knowledge – referring to principles and general strategies that can be used in teaching process, (iii) curriculum knowledge – referring to the teacher's knowledge to what should be taught, what materials that are needed in class and what the students understand in the previous class, (iv) pedagogical content knowledge, referring to the teacher's ability to teach in suitable pedagogical forms. This include choosing suitable and relevant strategies and methods in teaching the subject content to the students, (v) knowledge on the students' behavior and attitudes, (vi) knowledge on education context and (vii) knowledge on the objectives of education.

Of all the seven knowledge listed, Shulman (1987) stated the importance of the teacher's subject content knowledge and pedagogical content knowledge. He explained that an excellent

teacher is who masters his subject and is able to transfer his mastery on the subject into suitable pedagogical methods. According to him, pedagogical content knowledge is the ability of the teacher to change his subject content knowledge into suitable forms for teaching. He suggested that teacher training institutes need to include the two knowledge; the teacher's subject knowledge and pedagogical content knowledge in their training programs.

Shulman (2004) introduced *Model of Pedagogical and Action* to explain how teachers think and act to translate their knowledge of their teaching subjects into lessons that made the students understand easier and faster. According to him, it is a process of planning and carrying out action that involve six aspects: (i) understanding the objectives of learning a subject and the organization of the subject that will be taught, (ii) a transformation, that is the teacher has to change the content of their subject into effective pedagogical forms such as lecturing, discussioning and et cetera, (iii) teaching using the suitable and relevant method, (iv) assessing students to test their understanding such as question and answer session, (v) reflecting the students' ability to absorb the lesson and the teacher's teaching capability, (vi) using the new knowledge acquired as guidance to teach for the next class.

Frostig & Maslow (1973) states that in choosing teaching strategies or method, teachers have to think of a way that promises the students' participation and active class interaction so that the learning process is more effective and efficient. They also said that a high-quality learning process can be achieved if the teacher has a deep knowledge and understanding teaching and learning process.

According to Abdul Malik (1997), to determine that the teaching is effective, the teacher must master teaching methods, has a wide and deep knowledge on the subject that he taught, and equipped with knowledge related to education and the provided curriculum. Teachers must include recent issues and problems in the teaching and learning process so that the students will be knowledgeable and resourceful.

Lilia & Norlena (2000) agreed on the above statement, saying that a teacher who is weak in pedagogical knowledge will carry out teaching and learning process traditionally, where the teacher will only give lectures whereas the students will learn through memorizing, instead of understanding. Consequently, it can be concluded that less knowledgeable teachers will not be able to stimulate the students' creative and critical thinking. This teaching and learning process is no longer relevant and will not meet the requirement of our curriculum now.

Ahmad Tajuddin Jab (2009) suggested that to equip the teacher with curriculum knowledge, professionalism of the teachers must be upgraded parallel to the recent curriculum changes. The upgrading and improving of the teachers' professionalism is to increase their knowledge, skills, attitude and values that will enable the teachers to be competent and excellent teachers. He suggested the following aspects must be improved; (i) pedagogy general knowledge; that include teaching strategies, class management, knowledge about students and learning, (ii) subject matter knowledge: knowledge on the subject matter that will be taught, (iii) pedagogical content knowledge: the methods on teaching a certain subject (example: automotive field is different than any other vocational fields), knowledge on curriculum and curriculum tools, (iv) knowledge about the students and their context; families and school, (v) the relation between theory and practical, (vi) knowledge on strategies, techniques and instruments to sustain

the learning atmosphere, (vii) knowledge, skills and values to interact with students from different culture and religion and (x) knowledge and skills to use technology for effective teaching.

Schank (2003) explained that learning through experience and activities rarely practiced due to the difficulty to carry it out in a classroom that has many students and limited facilities. Because of that, the teachers took the easiest way which is by delivering the lessons by lecturing although they knew the method is not an effective teaching method.

To put it simply, the teacher and the school reality are two important factors in determining the quality of our education system. We have to know that changes in education practice will take a long time. Thus, it is not enough to suggest a cooperative or constructive learning method without knowing the detailed elaboration of the methods and how to carry it out and experience it until the teacher is able to master the methods very well (Nik Azis, Hashim & Hamedi, 2006)

A successful teaching lesson requires choosing the right teaching methods suitable to learning styles and learning objectives. By choosing the right method, it is hoped that the students will be able to absorb the lessons taught by the teachers easier and better. Previous research had proven that there is a relationship between teaching and learning methods to the success on achieving learning objectives. For example, a research by Cage (1975) in Norasmah Othman and Shuki Osman (2009) shows a positive result where teaching methods that are chosen and even the teacher's attitude and personal traits will affect the students' attitude and achievement.

The findings of Cage (1975) is supported by Reece and Walker (2006), agreeing that there is a relation between different teaching methods and their different uses. They suggested teachers to use different teaching methods according to certain situations so that the students can absorb the information given better. In instance, to deliver a lesson about a certain skill, teachers are advised to use demonstration, group teaching, video, laboratories, field work, simulation and projects. To deliver a lesson on theories or concepts, it is advised to use lecturing method, demonstration, laboratories and games. For explaining facts related to affective attitude, discussion, debate, field work, role play, simulation and tutorial are ought to be the best method for it. A clear view on the suitable teaching method for certain learning and teaching objectives can be seen from the Image 1.0.

From the methods listed by Peterson et.al (1984) and Reece and Walker (2006) there are only a few methods that were explained clearly and it will be used in the research. Lecturing method is where the teacher orally deliver and explain the lesson. This method is very popular among teachers, probably because it is easy to be carried out and it only depends on the teacher's knowledge and ability to speak fluently. If the teacher has a deep understanding and master the topic that he wanted to teach, the teacher will successfully deliver the lesson to the students systematically and comprehensively. Nevertheless, problems will arise if the teacher do not master or understand the subject matter well. The process of teaching and learning during class period is only used to finish the subject syllabus; separately and with no continuation.

Ordering method is a method where it does not involve the teacher much, but more to the students. In this situation, the teacher will give orders to the students while teaching. This method involves the teacher giving instruction and guidance to the student before starting any lesson. The instruction given must be structured and systematic so that the teaching and learning process runs smoothly. The process of giving

instruction usually takes a long time before the student are given freedom to carry out the activity during the lesson. For example, a Science teacher will give instruction to the students before carrying out any experiment in the laboratory. The teacher must make sure that the students follow the instruction given. It can also be seen in vocational subjects, Household Science and Life Skills.

Teaching Method	Teaching Objective					
	Cognitive		Affective		Psychomotor	
	Low	High	Low	High	Low	High
Lecture	√					
Demonstration	√				√	
Group teaching		√		√	√	
Discussion		√		√		
Debate		√				
Question & answer		√				
Video		√	√		√	
Seminar		√	√			
Laboratories/ workshop		√	√		√	
Games/Quiz		√	√			
Brainstorm		√				
Buzz group		√				
Field work		√				
Role play		√				
Ice Breaker			√			
Simulation		√		√	√	
Case research		√				
Project		√	√		√	
Tutorial		√		√		
Distance learning		√				

Source : Reece dan Walker, 2006, pg.128

#### Image 1.0: Teaching And Learning Methods Based On Teaching And Learning Objectives

Repetition or drilling method can also be used where the students will do a certain activity or exercise repeatedly until the students master the topic given, and automatically say, memorize and redo the activity if they were prompt to. The method is based on the principle '*practice makes perfect*'. For instance, in Mathematics, the students will be given exercise and questions repeatedly so that they can master the solution for the mathematical problems that they are studying. Repeating technique helps the children memorize concepts that they have learned. Nonetheless, teachers have to put into consideration the frequency of the repetition so that the students will not grow bored on the topic. However, according to Mohd Rahmat (2000) teachers are suggested to have one to three minutes break in between the lessons so that it is easier for the students to recall the previous lesson they have learned.

Discussion method encourages exchanging ideas freely between students and between students and teacher. This method will produce creative and innovative students as the students are able to discuss a topic before the teacher gives the explanation. The teacher will be the first person to start the discussion by announcing the topic. To ensure that the discussion is successful, it is important to have a detailed and thorough plan so that the discussion will not stray away from the topic. According to Kamaruddin (1993), discussion is a teaching

strategy in the form of conversations between student under the supervision and control of a teacher. This statement is supported by Dillon (1995), explaining that discussion is a form of interaction between several people and what is discussed is the topic of the issue.

Demonstration is used to teach how to do something, so that the students see and follow the series of certain steps, events or situation. It involves the teacher as the demonstrator. The teacher will have to show to the student the correct steps in carrying out certain activities. This method is usually used to deliver information or skills that require the students to do a certain activity such as carrying out an experiment. This method is also used when it involves using expensive tools and the students are prohibited from doing it by themselves. Demonstration is vastly used in subjects involving laboratories such as Science, Living Skills, and Vocational (Automotive, Welding, Air Conditioning, Electric, Electronic and et cetera). Generally, teachers will show the steps one by one and as soon as the students understand the steps well, they will be given opportunity to carry out the activity by themselves.

Project work is recently practiced by teachers nowadays. This method gives the same effect as exploration-discoveries method, only that this method focused on creating only one project and the process involved. Teachers must have a thorough and detailed plan to carry out this method. The teacher will have to give a detailed explanation on how certain parts of the project is carried out. The students will be able to gain knowledge throughout the project work.

In conclusion, a teacher cannot deny that even though the knowledge and understanding of their subject matter is the basic requirements for teaching (in the aspect of what they want to teach), knowledge and mastery of various teaching methods (in the aspect of how to teach effectively, to coincide the teaching objectives) is just as important. In pedagogy field, both aspects complement each other. In the context of this research, the researchers want to see how far the identified teaching methods is used by the teachers when teaching in the class. The researchers also want to see if there is any significant relationship between their teaching method and their knowledge on their subject matter.

#### Methodology

This research is a descriptive research using survey method that uses quantitative approach. This research uses questionnaires as research tools to obtain information regarding the pedagogical practice of Semester 7 Design and Technology option teacher trainees of Institut Pendidikan Guru Kampus Tun Hussein Onn, Batu Pahat, Johor, Malaysia. The population of this research involves 81 teacher trainees who teach Living Skills in primary schools in Batu Pahat, Kluang and Mersing when they were carrying out teaching training during semester 7. Based on the population, the suitable sample size is involving all the population as the sample for this research.

#### Research Findings

##### Pedagogical Practice Level of Design and Technology Teacher Trainees

According to the level of the pedagogical practice of the Design and Technology teacher trainees that is shown in Table 1.0, the data shows that in total, the pedagogical practice level amongst the teacher trainees is in moderate (mean=2.65). The research findings also revealed that the teacher trainees using discussion and project work method is also moderate, where both of the mean are 2.90 and 2.87 respectively. Nevertheless, the usage of lecturing and demonstration method is encouraging, both of the means are 3.22 and 3.05 respectively.

From the findings and mean comparison, the research shows that the teachers' pedagogical practice are still focused on the lecturing method for the topic studied in the Welding curriculum. To summarize, the research also shows that the pedagogical practice amongst teachers are still in moderate level after all the teaching methods studied.

**Table 1.0. Mean scores, standard deviation and Pedagogical Practices of Design and Technology Teacher Trainees**

Teaching Method	Mean	s.d	Level
1 Lecture	3.22	0.475	High
2 Discussion	2.90	0.570	Moderate
3 Demonstration	3.05	0.504	High
4 Project	2.87	0.519	Moderate
Total	2.65	0.298	Moderate

Note: mean 1.00-2.00=low; mean 2.01-3.00=moderate; mean 3.01-4.00=high

#### Discussion

Research findings shows that pedagogical practice level of Design and Technology teacher trainees in using teaching methods during teaching and learning process in classroom or workshop is only leading to a certain approach. Majority of the teachers use lecturing method which is the most popular, and demonstration is the second method usually practiced by the teachers teaching Living Skills. Such results are also displayed in the researches by Nor Aisah (2000), Power and Cohen (2005), Mohd Azlan dan Yahya (2009) and Dewa (2009) which all of them showed that the teachers teaching vocational subject still bound to the lecturing method which centres on teachers whereas teaching methods such as projects, discussion and demonstration is not popular among them. An earlier research by Harold (1996) also shows that teachers are more into lecturing method when they are teaching, compared to other teaching methods.

#### Conclusion

Teachers' practices in carrying out curriculum are related to the teachers' mastery on three main elements which are subject content, pedagogy knowledge and assessment. If the teacher master his subject content both theoretical and practical, able to adjust his subject content knowledge into suitable teaching method and carrying out assessing method that can test the students' understanding, it will leave a great positive impact in applying curriculum approach in the classroom (Habib & Baharudin, 2012). Thus, the mastery of teacher trainees of Institut Pendidikan Guru Malaysia (IPGM) on pedagogy knowledge is very important in carrying out the curriculum of Design and Technology so that the previous curriculum approach which uses conventional approach that emphasizes on cognitive domain can undergo transformation to produce creative thinking students. This, in the same time will develop values and attitude of an individual student in terms of affective and psychomotor domain. The integration of the three domains applied will be able to produce students with high creativity. Conclusively, this research findings suggested that by knowing the pedagogical practice of teacher trainees, it can be utilized in terms of preparing development programs, training, motivation and building IPG infrastructure that focuses on the target of producing competent teachers.

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