IMPLEMENTATION OF CONTEXTUAL SYSTEM IN MATHEMATICS COURSE

[1]Nafisah Kamariah Md Kamaruddin & [2]Zulkarnain Md Amin

Universiti Tun Hussein Onn Malaysia (UTHM)
[1]nafisah@uthm.edu.my, [2]zulkarn@uthm.edu.my

ABSTRACT. Teaching mathematics effectively is a challenge to lecturers. In school, students learnt mathematics mechanistically, that is memorizing the formula. Then they manipulate the formula with different numbers. They fail to find meaning in the topics. In the Mathematics Department in Universiti Tun Hussein Onn Malaysia, contextual teaching and learning (CTL) system is adopted. Contextual teaching and learning (CTL) is a system of instruction that allow students to find the meaning in their lesson. Then they connect the new lesson to the real world. This study examined the implementation of contextual system in the teaching and learning mathematics. A survey was used to collect the perceptions of the third year technical education students. The data was analyzed to obtain the mean, and standard deviation. Research finding showed they agreed that the teaching and learning is still focusing on the manipulation data, memorizing formulas, not holistic and separating between thinking and doing. In the test and exams, a lot of imaginative questions are still used. Thus, this showed that the eight components in the contextual system are not being implemented properly especially in implementing authentic assessment.

Keywords : mathematics, contextual system, higher learning institution

INTRODUCTION

Many higher learning institutions in Malaysia had recognized the weaknesses in the methods of teaching and learning. Teaching mathematics effectively is a challenge to lecturers. In school, students learnt mathematics mechanistically, that is memorizing the formula. Then they manipulate the formula with different numbers. They fail to find meaning in the topics. Students-centered learning seemed to be the focus. Few universities in Malaysia had adopted Problem Based Learning. As in the Mathematics Department in Universiti Tun Hussein Onn Malaysia, besides adopting PBL, contextual teaching and learning (CTL) system is also implemented. In 1997, the Technical Education Department under the Ministry of Education, Malaysia, introduced the contextual approach, where they got the concept from America, in the teaching and learning mathematics and additional mathematics in all Malaysian technical secondary schools. (Md. Kamaruddin, N., 2007a). The students were able to understand abstract concepts through concrete experiences. A good student commented that she would still understand the concept by either method but she understood faster with the contextual approach (Md. Kamaruddin, N., 2007a). Students prefer this method because they learn mathematics very mechanistic, which is, memorizing the formula and solving problems using the formula. (Md Kamaruddin, N., 2007b). Not only the students are able to learn faster but the workplace and lab activities help students to develop critical thinking skills (Md. Kamaruddin, N., 2007c). Besides using concrete experiences, the use of video clips can help students know how mathematics is used in the real world. The illustration with video attracted their attention during the lesson and this approach was able to motivate them to focus on the lessons (Md. Kamaruddin, N., 2005). This method of teaching mathematics is good for technical students (Md. Kamaruddin, N., 2006). In Problem-Based Learning, the contextual concept is used as this method of learning is built around the delivery of the real-world learning experience (Md Kamaruddin, N., 2007d). From the research done in Universiti Tun Hussein Onn Malaysia, students preferred to learn statistics using the contextual concept and they scored better than the group who did not use this concept (Md. Kamaruddin, N., 2007e).

Purpose of the Study

Researches done previously were focusing on the use of contextual video, lab and class activities, and not on the contextual system. Thus this research was done to survey on the implementation of the contextual system in the teaching and leanring matematics.

Conceptual Framework

The research conceptual framework is adapted from Johnson, E. B. (2002) and is shown below:

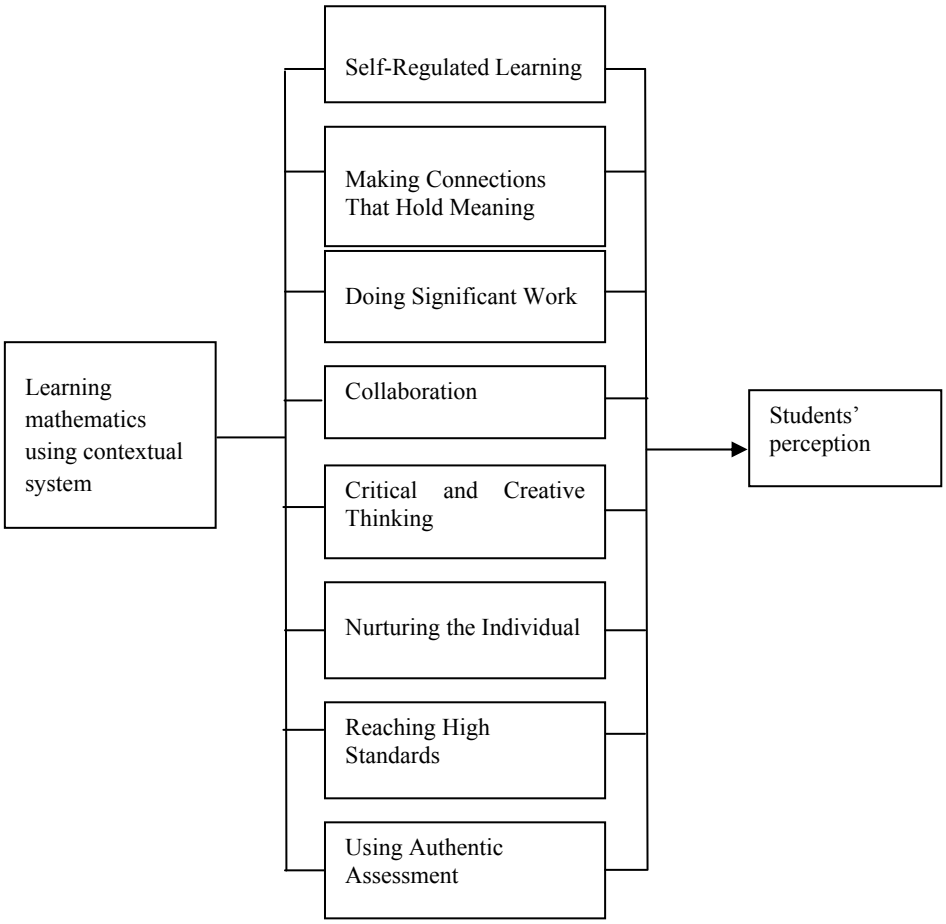

Figure 1. Conceptual Framework

LITERATURE REVIEW

There are many definitions of the contextual learning. The definition that the Technical Education Department uses is the one that was given by the Center for Occupational Research and Development (First Malaysian Tech Prep National Convention, 1997) which is learning that incorporates examples drawn from everyday experiences in the personal, societal and occupational life and which also provide concrete hands-on applications of material to be learned. Contextual Approach was introduced for the students' technical and career preparation or Tech Prep by the Center for Occupational Research and Development, Texas, USA. Contextual approach is one of the Tech Prep elements. According to Kolb's Experiential Learning Theory, the students learn best by thinking and doing (Kolb, 1985). In the contextual approach, the lab activities or mathematical experiments help students to study by this method. According to CORD, one of the key elements in the contextual approach is to carry out learning in workplace setting, where possible (First Malaysian Tech Prep National Convention, 1997).

It will be great if the students can relate the formulas and theories that are taught in the classroom to their everyday lives or their future jobs. Is not easy to bring students to the real life atmosphere, let say a company. Thus if we cannot bring them to the companies, we need to simulate the workplace. In the lab practical, besides making them understand the concept, the students also work in environment or group projects that simulate the workplace. In the contextual approach, students engage in problem-solving investigation that integrate skills and concept from many content areas, students works autonomously to construct their own learning, and culminate in realistic products (Berns et all, 2001). By using the lab activities or mathematical lab in the contextual approach, it helps them to understand the concept better as the concept of experiential learning explores the cyclical pattern of all learning from Experience through Reflection and Conceptualizing to Action and on further Experience (Kolb, 1985).

In the first project by the Ohio State University College of Education and Bowling Green State University, the definition of contextual teaching and learning was developed. The conception of teaching and learning that helps teachers relate subject matter content to real world situations and motivates students to make connection between knowledge and its applications to their lives as family members, citizens, and workers; and engage in the hard work that learning requires (National Conference on Teacher Quality, 2000).

METHODOLOGY

This study examined the implementation of contextual system in the teaching and learning mathematics in one of the public university in Malaysia. A survey was used to collect the perceptions of the students.

Subjects

Technical education students from the Technical Education Faculty from the Universiti Tun Hussein Onn Malaysia were invited to participate in this survey. The technical students will take 4 mathematics subjects: Algebra and Calculus in their first year, Differential Equation and Statistics in their second year. Respondents were drawn from the following subject areas: civil engineering, electrical engineering, and mechanical engineering. A total of 62 questionnaires were given out to the third year technical education students. Of these, 42 (67.74 %) questionnaires were completed and returned.

Instrument

The questionnaire developed for the survey was based on the book "Contextual Teaching and Learning" written by Elaine B. Johnson and Teaching Mathematics Contextually by the Cornerstone of Tech Prep, Cord. The questionnaire consisted of ten parts. Subjects were asked to assess the contextual system in the teaching and learning mathematics, using a five-point Likert-type scale (from '5' = 'Strongly Agree' to '1' = 'Strongly disagree'). The ten main sections of the questionnaires are shown in Table 1.

Table 1. *Main Sections*

Section	Item No	Data Analysis Method
A : Background	1 – 3	Percentage
B : General	1 – 5	Score mean and std dev
C : Making Connections That Hold Meaninful	1 – 5	Score mean and std dev
D : Doing Significant Work	1 – 5	Score mean and std dev
E : Self-regulated Learning	1 – 5	Score mean and std dev

F : Colloboration	1 – 5	Score mean and std dev
G : Critical and Creative Thinking	1 – 5	Score mean and std dev
H : Nurturing the Individual	1 – 5	Score mean and std dev
I : Reaching High Standard	1 – 5	Score mean and std dev
J : Using Authentic Assesment	1 – 5	Score mean and std dev

RESULTS

Respondents Background

The background of the respondents is shown in Table 2.

Table 2. *Respondents Background*

	Category	No of respondents	Percent (%)
Gender	Male	14	33.3
	Female	28	66.7
Course	Civil	2	4.7
	Electrical	33	78.6
	Mechanical	7	16.7
CGPA	< 2.49	0	0.0
	2.50 – 2.99	1	2.4
	3.00 – 3.49	26	61.9
	> 3.	15	35.7

In section B, the researchers want to survey on the general perception of the students of the implementation of the contextual system. There are 5 items in this section as shown in Table 3.

Table 3. *General*

Section B	Mean Score	Standard deviation
The teaching and learning is		
1. focusing on doing mathematics exercises	3.81	0.71
2. focusing on manipulation of data	4.00	0.49
3. focusing on memorizing the formula	3.74	0.80
4. not holistic	3.24	0.98
5. separating the thinkng and doing	3.48	0.94

In section C – J the researchers want to survey on the implementation of the contextual system in the teaching and learning mathematics.The results shown in Table 4 is the overall mean for each section.

Table 4. *Contextual System*

Section	Mean Score	Standard deviation
C : Making Connections That Hold Meaninful	3.30	1.18
D : Doing Significant Work	3.21	0.97

E : Self-regulated Learning	3.64	1.03
F : Colloboration	3.80	0.87
G : Critical and Creative Thinking	3.64	1.01
H : Nurturing the Individual	3.39	1.02
I : Reaching High Standard	3.52	0.92
J : Using Authentic Assesment	3.20	1.08

In one of the item in Section D, students agreed that the teaching and learning is more on the lecturer giving information to the students with the mean of 2.71 and the standard deviation 1.01. In addition, in one of the item in Section J, students agreed that a lot of imaginative questions were given in the test or final with the mean of 2.63 and standard deviation 0.97.

CONCLUSION

This study set out to survey on the implementation of the contextual system in the teaching and learning mathematics. Although they agreed that the eight components in the contextual system are being implemented, a lot the questions in the test and examination is still imaginative questions. Thus, the last component in the contextual system, which is authentic assessment, is not properly implemented. Steps should be taken so as the questions that relate to the application of the topics in the real world should be asked in the teast and final examination.

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