

Integration of TQM in Blended Learning

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ABSTRACT

Many tools have been developed to assist the teaching and learning process. However, it is difficult to find one suitable for all students' needs. With strong support from the top management, TQM can be applied to higher education which can provide better service. Blended learning, which includes student-centered and independent learning approaches, requires a strong sense of motivation. Although motivation is an important factor in blended learning, the literature has not adequately explored how students can be motivated in blended learning. The integration of TQM in Blended Learning using PDCA will ensure more efficient learning. 99 students, who took Computer Programming in Universiti Malaysia Terengganu were involved in this research. This study proposed the use of the TQM approach in the implementation of Blended Learning. Using this approach, the element of Plan and Do was used in the preparatory work. For face-to-face learning, the Check element was implemented, while the Action element was found to be very useful for enrichment work. The result of the study found that the total mean score after intervention was 18.49 higher than before the intervention showing that TQM integration in Blended Learning enhances student learning performance. This paper contributes to the motivation to apply TQM to learning using a web-based environment and face-to-face mode.

Keywords: Total Quality Management, blended learning, PDCA, teaching and learning

INTRODUCTION

Education is a continuous learning process which helps to develop and explore further information. In recent years, computers with the support of internet access and distance learning capabilities have been dominant in the learning environment. Blended Learning (BL) is a mix of traditional methods of teaching, such as face-to-face teaching and on-line teaching. The use of different teaching methods provides students with a higher level of independence in the learning process but requires a strong sense of motivation.

Total Quality Management (TQM) has gained wide acceptance in the global market. Previous researches have proven that TQM methodologies have been successfully implemented in many different fields such as the automotive industry, software products, software quality, process reengineering and software testing. Due to the success of TQM in manufacturing companies, it was then applied to service organizations, universities, hospitals, hotels and education (Al-Tarawneh & M. Moayyad, 2011). Deming's concept of TQM is applicable to both academia and industry (Ooi et. al., 2011; Aldaweesh, 2011; Sabet, 2012) which provides guiding principles for needed educational reform (Mehrotra, 2011).

The purpose of this study is to discuss the integration of TQM in BL. This paper is organized as follows: Introduction in Section 1; Section 2 presents Related Work; and Section 3 focuses on Issues and Challenges in Teaching and Learning. The paper then continues with Section 4 which includes the Integration of TQM in Blended Learning while Section 5 presents the Research Methodology used. Finally, the Results and Discussion are presented in Section 6 with the Conclusion in Section 7.

RELATED WORK

BL is a type of learning that is facilitated through the combination of learning environments like lectures, workshops, self-packed study, simulation, online collaboration and the use of interactive multimedia (Draffan & Raingerb, 2006). BL can generally be classified into six models: Face to face drivers, rotation, flex, labs, self-blend and online driver. BL was chosen as a learning

tool for three reasons: to improve pedagogy, to increase access and flexibility, and to increase cost-effectiveness. Most researchers agree with the positive effects of using e-learning course material. Some of the potential are to improve students' commitment to the learning process and become more responsible and active participants in e-learning environments (Norfadilah et. al., 2009). Students' views on BL in terms of their learning styles are positive (Uğur et. al., 2011) and significantly reduces the need for face-to-face instruction (Napier et. al., 2011). However, although blended learning is now being practiced in the higher education sector, there has been much debate about the usefulness of the term (George-Walker & Keeffe, 2010). BL, which includes student centered and independent learning approaches, requires a strong sense of motivation. Although motivation is an important factor in the blended learning system (Rovai & Downey, 2010), the literature has not adequately explored how students can be motivated during BL (Ocak, 2013).

Continuous improvement is one of the core values of TQM. The benefits of TQM include enhanced customer satisfaction, reduction or elimination of problems, improved attitudes, enhanced communication, reduced waste and rework (Shakuntalaben, 2013). TQM can be applied to higher education which can provide better service (Al-Tarawneh & Moayyad, 2011) by modifying some important aspects in terms of institutional needs (Shakuntalaben, 2013). With strong support from the top management, the higher education sector should become more innovative in knowledge creation to achieve a higher standard in providing good services (Zabadi, 2013). TQM is a management approach to sustain long-term organizational success. There is no particular standard to follow in adopting the TQM method, because their unique concept is implemented based on individual organizational needs or cases (Trehan & Kapoor, 2011). Refer to Table 1 for the implementation of TQM in various industries including education.

Table 1: The Implementation of TQM

Author	Education	Medical	Software	Engineering
Feng & Chen (2010)			√	
Zhang (2010)			√	
Jingsong et. al. (2010)		√		
Vieira et. al. (2012)				√

Gordon et. al. (2008)		√		
Raouf (2008)	√			
Lyu (1996)				√
Walasek & Kucharczyk (2011)	√			
Beth (2010)				√
Wood & Petocz (2008)	√			
Mat Jani (2011)	√			

ISSUES AND CHALLENGES IN TEACHING AND LEARNING

There have been several studies in the literature reporting the issues and challenges in teaching and learning (T&L). In education, the issues and challenges of T&L were widely reported especially in the area of mathematics, chemistry, programming and medicine. In computer science, the programming subject is among the most important and difficult subjects (Ibrahim et. al., 2011; Teague, 2009; Muratet et. al. 2009). T&L for basics in programming is a challenge for both instructors and students (Johnny, 2010). Among the problems faced include students finding this subject boring, difficult to understand and the use of uninteresting teaching methods (Roslina & Nazli, 2009).

Motivating and supporting student interest in the T & L process is one of the biggest challenges in chemistry teaching (Aksela & Bostrom, 2012). In addition, students also have trouble in mastering discrete mathematics, even though it is a very important course for computer majors. Discrete mathematics is not easy for students because it is a highly abstract subject (Yahong et. al., 2011). Meanwhile, in medical education, an alternative T & L approach can be carried out by enhancing the interaction between learners to make them more independent (Muhsin, 2008). Two major problems have been identified: weak motivation and usage of unsuitable learning strategies among students (Liu & Lin, 2010).

Based on the abovementioned issues, an effective and suitable pedagogical method should be used in class implementation as a step to

motivate and support students' learning. Refer to Figure 1 for the causes and effects of T&L in chemistry, mathematics, medical and programming courses.

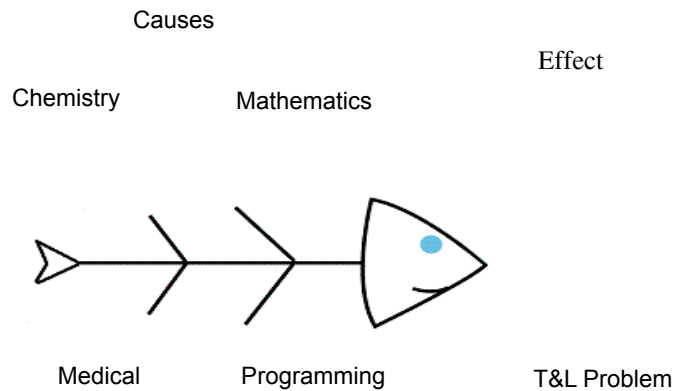


Figure 1: Fish Bone Diagram for the Causes and Effects on T&L

INTEGRATION OF TQM IN BLENDED LEARNING

An extensive review of literature on TQM was applied in generating the model for this research. This research proposes a TQM based method for related subjects, through the use of BL, as a medium for learning. Refer to Figure 2 for the implementation of TQM in BL.

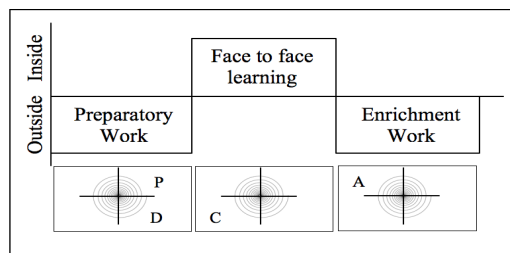


Figure 2: TQM based Method in BL

Table 2: Details of TQM Integration in BL

Preparatory Work	P	Define the concept, aims and objectives of learning.
		Determine Learning Activities
	D	Implement the planned processes
		Prepare Learning activities
Face to face learning	C	Distribute, Check and Discuss the learning activities.
		Measure and compare the results with the established goals
Enrichment Work	A	Take Action for Enrichment Work

An exhaustive literature review was carried out to understand the conceptual development of TQM in order to highlight the importance of various factors that lead to effective implementation of BL. Using conventional learning, instructors are responsible for preparing teaching material before the class session. During class, the instructor usually asks students to do some exercises using a computer by distributing a set of papers. This current approach contributes to the higher cost of paper, waste of time and higher workload for assessment. Table 2 represents the implementation of TQM in Blended Learning.

This paper proposes a model to overcome the limitations involved in the current learning process implemented. Through this idea, the T & L can be divided into two sessions: outside the classroom and inside the classroom. It begins with the *Plan and Do* (P and D) phases, outside the classroom, which is related to preparatory work. A set of questions is included in the e-learning system. Working as a bank of questions, a variety of related problems is attached in this learning tool for students to access and work on before coming to class. Meanwhile, inside the classroom, during the face-to-face interaction between the students and instructor, discussions can be conducted. The activities given before the class implementation will be *Checked* (C) at this time, and additionally, the results can be measured. As enrichment work, *Action* (A) can be taken for every result obtained inside the classroom. This will ensure that the BL activities will continuously improve.

Applying the PDCA approach will hopefully provide a guideline for continuous improvement in BL. If any problems appear, the important thing to do is to classify the problem within the scope of the four important steps: Plan, Do, Check and Action. This type of learning can automatically assess the performance of learners, and is believed to motivate teachers by reducing the workload.

RESEARCH METHODOLOGY

99 students who took the Computer Programming subject were involved in this research. However, only 92 completed the testing successfully. A set of questionnaires was distributed to obtain the respondents' demographic profile and examine their programming background and perceptions toward this subject. Paired-samples T-Test was implemented to test for any significant differences between total mean scores before and after the implementation of TQM in BL. The data were gathered as in Figure 3.

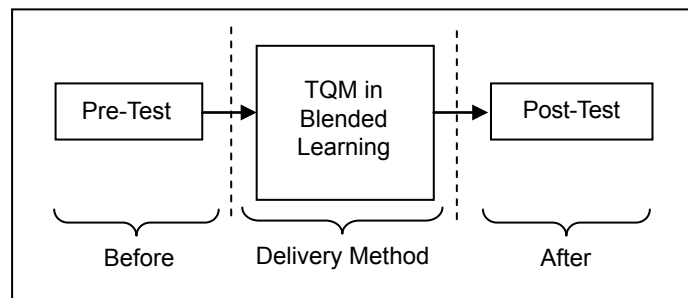


Figure 3: Data Gathering for the Delivery Method

Research Question

Are there any significant differences between students' total mean scores before and after the implementation of TQM in BL?

Hypothesis

H_0 : There are no significant differences between students' total mean scores before and after the implementation of TQM in BL.

$$(\mu_{\text{post}} - \mu_{\text{pre}} = 0)$$

H_1 : There are significant differences between students' total mean scores before and after the implementation of TQM in BL.
 $(\mu_{\text{post}} \neq \mu_{\text{pre}})$

RESULTS AND DISCUSSION

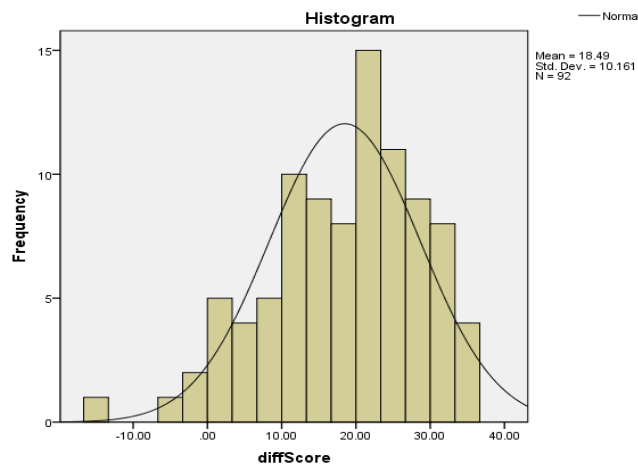


Figure 4: Difference in Scores for Pre-test and Post-test 1

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	posttest 1	86.5043	92	11.25081	1.17298
	pretest	68.0136	92	5.80496	.60521

Figure 4 shows that the data is normally distributed. Table 3 shows that the mean score for posttest1 is 86.50, and 68.01 for the pretest. Table 4 shows the p-value=0.00. Since p-value=0.00<0.05, H_0 can be rejected. Hence, there are significant differences between students' total mean scores before and after the implementation of TQM in BL. The total mean score after intervention is 18.49 higher than before the intervention. TQM integration in BL has been shown, in this study, to enhance student learning performance. It can be said that the implementation of TQM in BL in this research was successful.

This study proposed using TQM in the implementation of BL. As the PDCA model suggests, once the actions are planned, they are carried out, checked and actions are taken based on the results. The PDCA cycle is continued until the problem is sufficiently solved. This approach is advantageous in the implementation of T & L using BL. In this research, the PDCA cycle will always be evaluated for better results in BL.

Table 4: Paired Samples Test

Paired Differences (Pair 1= posttest 1 – pretest)							
Mean	Std. Dev	Std. Error Mean	95% confidence Inter of the Diff		t	df	Sig. (2-tailed)
			Lower	Upper			
18.49	10.16	1.059	16.39	20.59	17.46	91	.000

CONCLUSION

In this research, the total mean scores after intervention is 18.49 higher than before the intervention showing that TQM integration using PDCA in BL was successful in enhancing student learning performance.

This paper has contributed to motivating instructors to apply TQM to subject learning integrating a web-based environment and face-to-face mode. This approach will help decrease the “distance” between the students and the instructor by allowing for continuous interaction even after classes are over. The methodology relating to the implementation of web-based and face-to-face aims to ensure a high and constant quality of the T & L process, particularly in difficult and complex subjects.

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