

QUALITATIVE APPROACH IN DEVELOPING A TECHNOLOGY ACCEPTANCE MODEL FOR MOOCS IN MALAYSIAN HIGHER EDUCATIONAL INSTITUTIONS

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Abstract: *Online teaching and learning is becoming more and more popular among Higher Educational Institutions and as a result of which teacher educators are expected to know good models of effective practices, which are required to assess the online teachers' attainment. In this study, primary data collected through qualitative discussions were analyzed through the lens of online actives, in which, data gathered from 648 graduate teachers from 216 SMK schools in Perak were used. As one of the goals of the study is to assess and empower the teachers in online teaching and learning environment, the intentionality of the design of the work and the facilitation of the discourse throughout the work need to be modeled and facilitated by educators. As such, 10 teachers, were purposefully selected for the qualitative study from the sample size of 648 graduate teachers. Teachers' journey through online integration was examined through the lens of three models, namely, Salmon's 5 stage model, Technology Pedagogical Content Knowledge and Hooper and Rieber models, The outcome of this research paved way to teacher educators, who require technology acceptance models of how ICT can be appropriately integrated into rich teaching experiences for online integration of MOOCs.*

Keyword: *Pedagogical Content Knowledge, MOOC, Learning Environment, Technology Acceptance, Online Teachers' Attainment*

Introduction

Technology in classroom is widely believed to help teachers promote a constructive class environment and it is viewed by many researchers to have an influential effect on the teaching and learning process (Muir-Herzig, 2004). Further, Internet is being recognized as an important source for leaning resources in the educational field as the web provides an attractive, reliable variety of valuable resources current and past (Ruthven et al, 2004). Despite these apparent benefits, search shows that the innovation of traditional teaching and learning systems are able to contribute to the excellent outcomes (Farrington et al. 2012) and thus affect the marketability in the workplace (Brooks, 2011). MOOCs is identified as a potential approach and rejuvenated of traditional teaching and learning in order to respond to the fast-paced and

technology-driven environment of the 21st century. However, there are also issues on the values in the educational process itself in the implementation of MOOC (Conole, 2013; Watted & Barak, 2014). MOOC phenomenon provide an opportunity for a wide range of sustainability research in the future, particularly in the measurement of MOOC application, MOOC application development model and implications related courses offered in MOOC (Eloy et al. 2015).

Background

Jeyaraj, Rottman and Lacity (2006); Santos (2007); Espíndola, Struchiner and Giannella (2010); Struchiner (2011); Foster, McGrier and Sheets (2011); and Rielley (2015) cite different models and theories of adoption and diffusion of innovations such as theoretical framework of integration of ICTs in educational contexts (Hall & Hord, 2006; Moersch, 1995). These works are intended to describe the main stages of adoption of ICTs and analyze the individual factors (Tabata & Johnsrud, 2008; West, Waddoups & Graham, 2007) and institutional (Shuldman, 2004) that influence the process of change (Watson, 2006), from monitoring different experiences of educational innovation. The (Technology Acceptance Model) TAM is one of the most influential extensions of the (Theory of Reasoned Action) TRA of Martin Fishbein and Icek Ajzen (Ajzen & Fishbein, 1980). Developed by Fred Davis and Richard Bagozzi (Davis, 1989; Davis, Bagozzi & Warshaw, 1989), this model suggests that when users are presented with a new technology, many factors influence their decisions about how and when they will use it. According to Davis (1989), people tend to use or not to use certain technologies in order to improve their performance at work - perceived usefulness. However, even if this person understands that a particular technology is useful, its use could be compromised if the user finds it difficult to use such technology, so that the effort does not compensate the use - perceived ease-of-use (Technology acceptance model, 2003). Further, the evolution of Learning Management Systems (LMS) has made it easy to incorporate and disseminate a vast array of learning resources. Unfortunately, this abundance and variety of content does not always benefit students. Some online courses suffer because the sheer quantity of educational resources provided to the student does not align with course learning objectives (Koszalka & Ganesan, 2004). This is often due to the fact that course developers include extra options and resources simply because they can. To help prevent this from happening, Koszalka and Ganesan (2004) developed an instructional design taxonomy to help course developers strategically align LMS features with the teaching and learning goals of the course. One of the most important features of learning management systems for professors is the instructional tools. Most learning management systems to date have white board capabilities, file uploading, hyperlinks, both asynchronous and synchronous discussion boards, and an email system connected to each course. All the fore mentioned tools enable a professor to teach a class either face to face or online seamlessly (Reppert, 2001).

Ernst and Young's report on the University of the future (2012) provides a useful framework (p28) with a set of strategic questions to help identify what, at the highest level, an appropriate strategic direction for a university might be. The report emphasizes, "University leaders will need to find ways to stay true to the mission, maintain academic integrity and independence, and at the same time change their business and operating models" (ibid). Therefore, what is essential is to identify appropriate technology acceptance model that may ideally be used for MOOCs integration by assessing the teachers' online interaction and attainment, towards achieving academic integrity and independence.

Methodology

This research is part of a larger study that used both qualitative and quantitative approaches. However, in this paper only the qualitative data is used. From a sampling size of 648 teachers from 216 SMK schools in Perak, Malaysia, ten teachers were selected based on purposeful sampling. This included five teachers each from rural and urban schools. Action research method was used because, it is defined as systematic, self-reflective inquiry aimed at constructing knowledge about one's practice with the major goals of improving and coming to better understanding of the practice (Carr & Kemmis, 1986; Cochran-Smit & Lytle, 1993; Stenhouse, 1975). 7 themes were identified. All of the kappa coefficients were evaluated using the guideline outlined by Landis and Koch (1977), where the strength of the kappa coefficients =0.01-0.20 slight; 0.21-0.40 fair; 0.41-0.60 moderate; 0.61-0.80 substantial; 0.81-1.00 almost perfect. Of the 7 themes, 2 had moderate agreement, and five themes had almost perfect agreement.

Analysis of the Results

Any Web-based instruction is intentional learning if the specific content and instructional activities are presented within a framework that defines a relevant objective for learning (Grabinger, 1996. p.672). An excellent tool that meets these criteria, as well as many others, is the learning contract (Knowles, 1975; Knowles, 1990). Learning contracts allow the learner to address individual needs, objectives, and approaches to learning. Learning contracts are a teaching and learning tool for increasing learners' self-direction while attaining specified learning objectives. The learners develop the contract's contents in collaboration with the teacher who acts as a facilitator and subject matter expert (Noel LeJeune and Karen Richardson, 1998). In this research study, the analysis of the qualitative data is based on this theories.

A typical learning contract consists of four major parts. The first part is the statement of learning objectives; what knowledge, understanding, skills and attitudes the learners seek to acquire. The second part of the contract specifies the resources and learning strategies. Learners use these resources to reach the objectives. The third contract element is the evidence of accomplishment, the proof and recognition of the goals. Finally, the fourth piece of the contract relates to measurement. The criteria and means of validating the evidence measure the level of attainment of the learning objectives (Noel LeJeune & Karen Richardson, 1998).

Observation chart was used to scale the comfort levels in using Web tools in each module, with the scales "Low", "Moderate" and "High". Thus, after the observations of the ten teachers were completed, the teachers' level of difficulties and skills were recorded using the observation chart and, in the case, -ordered effects matrix. The consolidated summary is shown below in Table 1.0.

Table 1.0: Teachers' attainment Through First Learning Contact Module

Teacher No	Posting Message			Uploading notes		
	L	M	H	L	M	H
S1			/		/	
S2			/			/
S3			/			/
S4			/			/
S5			/			/

S6			/			/
S7			/			/
S8			/			/
S9			/		/	
S10			/			/

*L-Low M-Moderate H- High

Some of the teachers' dialogues during the interviews with them are listed below.

- S1: Sure, it is positive, firstly it is not confined to time. [2I6UA]
- S2: I think it is manageable with user manual... I have gone through the Web tools I have tried it at home. so, it is simple I can manage it without any guidance. [3I4UB]
- S3: Overall it is very good for using technology in teaching. It is added advantage for the students. [3I7UC]
- S4: As far as I am concern I am fine I can manage it is the matter of culture when this carries on. [3I3UD]
- S5: I did not find any difficulty in any of those. [3I5UE]
- S6: Well these tools I think it's very simple and I think with less guidance and with user manual I think all the teachers are able to use the Web tools. [3I4RF]
- S7: Oh sure, I can do it without anybody's guidance. [2I3RG]
- S8: Yeah of course, it is very simple method for me and it should be adopted in all schools. [2I5RH]
- S9: Okay overall, I think this program is very good, very good if you insist to do this thing ... you must continuously use it. [3I3RI]
- S10: I think it is very much handy thing...that the students can do on their own from the Web tools provided. This is good program actually and the teacher can give exercises online and the teachers and the parents can observe the studies at the same time saves time [2I3RJ]. Yes, this should have been done earlier... now they have identified, and they have introduced it in the school. Maybe it is a good one if teachers and students going to use it properly to take teaching and learning process towards e-knowledge society. [3I3RJ]

In addition to the above statements taken from the ten teacher participants and the observation chart showing the teachers different levels of attainment, it was clear that all these teachers had consciously used Web tools in a manner consistent to their pedagogical beliefs. The majority of the teachers had never developed Web-based instructions before, however teachers like S10, S9, S2 and S6 who had exposure to such technology integration were innovative while journeying though the Web tool modules. In this context, teachers who did not show the same

level of innovation as S10, S9, S2 and S6 cannot be underestimated in the effect of the factors influencing innovations in using Web tools. For instance, S8 was quite strong in some of the qualities, while infusing Web tools. He was also quite technologically proficient. In addition, he had journeyed through most of the Web tools modules easily (See Table 1.1). Thus, it was evident that even a competent instructor may struggle in using such Web tools. Therefore, it is plausible that this struggle by the teachers cannot be considered as a fear or an aversion towards technology innovation, but a desire to progress in their learning process.

Table 1.1: Teacher’s Attainment Through Various Modules Of Web Tools

Teacher	Lesson plan			Posting message			Uploading notes			Creating Links			Attendance			Reports /remarks			quiz			Web-tools usage			
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
S2			/			/			/			/			/			/			/			.	/
S4			/			/			/			/			/			/			/			.	/
S6			/			/			/			/			/			/			/			.	/
S8			/			/			/			/			/			/			/			.	/
S10			/			/			/			/			/			/			/			.	/

*L – Low M- Moderate H- High

The last part of the learning contract emphasised the contract relating to measurement. The criteria and means of validating the evidence measure the level of attainment of the learning objectives (Noel LeJeune & Karen Richardson, 1998). This stage was the crucial stage of the observation where it needed greater time and reasoning to assess how far the teacher participants were able to adapt themselves to the technology integration of Web tools. For assessing this stage of the learning contract the fifth and sixth observations were used, in which how teachers administered online quizzes was examined. Apart from the quiz administration, teachers were also observed on how they were able to manage the Web tools. This was used this in the assessment process because, to successfully integrate Web tools in classroom teaching, teachers not only require the skills to use them but also need the knowledge of how it works. To integrate Web tools in teaching, teachers need to know the affordance and constraints of various technologies and how specific technologies might support their own teaching curricular goals. They also need to know how these Web tools are administered and what textual factors make it work. Furthermore, teachers need to realise that technology integration requires support from others, even people with whom they have not interacted traditionally (e.g., technicians or technology coordinators). Therefore, in my last learning contract to measure how far the teachers could adapt themselves to such Web-based tools, administering quizzes and managing the Web tools were used as key factors. The teachers’ level of attainment is summarised in Table 1.2.

Table 1.2: Attainment Through Last Module Of The Webtools

Teacher No	quiz			Web-tools usage		
	L	M	H	L	M	H
S1	/			/		
S2			/			/
S3		/			/	
S4			/			/
S5		/			/	
S6			/			/
S7	/				/	
S8		/			/	
S9	/			/		
S10			/			/

*L – Low M-Moderate H- High

Looking at these facts and figures it was evident that only four out of the ten participants who were involved in this study were able to journey through the Web- tools without any hindrance. S7, a chemistry teacher in the rural school, felt similar to a few urban school teachers that it would also be essential to have diagrams included in the online quizzes. She was also supported in the same views by a mathematics teacher, S6. Khalijah of the same school. S9 and S8 of the same rural school felt that using online quizzes would be of added advantage in the classroom. However, they did not mention about including diagrams in online quizzes. Thus, we can see that S9 and S8 in spite of mentioning the online quiz as an advantageous factor in their classroom teaching, did not try to identify the additional features that would be supportive while integrating them. This can be due to many reasons. One of the main reasons is not having sufficient Technological Pedagogical Content Knowledge (TPCK). Moreover, the four teacher participants already had exposure to Web tools and awareness of its usage. Thus, the lapse of the other six teachers, who were not able to successfully journey through the Web tools without hindrance, was not due to lack of ICT advice, with regard to the technical aspect of the Web tools and delivery, but rather an opportunity to develop a more thorough grounding in the skills required to use Web tools. Thus, this finding gives implication for further research, to find if such a lapse on the teacher's part to adopt Web tools without hindrance was due to the unwillingness to shift from traditional modes of delivery to Web-based teaching. The consolidated teachers' level of attainments for all the 6 modules are summarised in Table 1.3.

Table 1.3: Teachers’ Attainment Though Various Modules of The Webtools

Teacher No	Lesson plan			Posting message			Uploading notes			Creating Links			Attendance			Reports /remarks			Quiz			Web-tools usage		
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
S1	.	/				/	.	/		.	/		.	/				/	.	/		.	/	
S2			/			/			/			/			/			/			/	.	/	
S3			/			/			/			/			/			/			/			/
S4			/			/			/			/			/			/			/			/
S5			/			/			/			/			/			/			/			/
S6			/			/			/			/			/			/			/			/
S7	.	/				/			/			/			/			/	.	/				/
S8			/			/			/			/			/			/			/			/
S9	.	/				/	.	/				/			/			/	.	/		.	/	
S10			/			/			/			/			/			/			/			/

*L – Low M- Moderate H- High

With the six observations with the ten teacher participants, from Table 1.1, it could be identified that the different levels of attainment of these teacher participants, by using the case-ordered effects matrix followed by observation charts with scales of “Low”, “Moderate” and “High”. The low scale was assigned to teachers who took a long time to complete their tasks, inconsistently assigned their activities and managed to complete their tasks only with guidance. The moderate scale was assigned to teachers who managed to complete their tasks referring to the user manual and less consistently used it for more mechanical activities targeting individual development skills. The higher scale was assigned to teachers who used the Web tools consistently as a part of their regular literacy curriculum and managed to complete the tasks without any guidance. However, one could notice that three teachers (S1, S9 and S7) were not comfortable while journeying through the first module of the Web tools. It was noticed that they did not utilize the Web tools in the classroom nor seemed to have commitment in using the technology as a pedagogical tool. Supporting the above facts from the teachers’ observations, the opinions taken from the interviews of these three teachers, give an opportunity to understand the teachers’ attitude in a precise manner.

S1: I think I did find many difficulties. If I do it continuously I think it would not be a problem as a part of my job [2I5UA]. I have really not tested it so it was only during the observation I have tested. [2I4UA]

S9: I think there is no difficulty, but I think I have to spend more time in working with the Web tools. [3I5RI]

S7: But when it comes to lesson plan and linking it to website was bit difficult. [3I5RG]

From the statement of S1, it is clear he had not used the Web tools in the classroom, as he mentioned that he had used them only during his observation sessions in this study. Also, it is clear from his statement that he did not use them continuously as part of his job. Similarly, S9 mentioned that she had not spent much time using Web tools. Thus, there seems to be a lack in technology integration of Web tools or a desire to use them continuously in their classroom. In the case of S7, she was able to post messages with ease using the Web tools, but she found posting lesson plans to be a bit difficult. This is an interesting point to note, as posting messages and uploading lesson plans had identical user interface and same strategies, but still, she mentioned that uploading lesson plans was a bit difficult. This shows that she had not shown the same desire as she had during her first observation, as she moved to the next stage of her observations. The rest of the seven participants were adapting to Web tools and using it as an integral part of their teaching in terms of delivery, learning, management, or other aspects of the class. The opinions of the seven teachers taken from their interviews respectively give us an indication about the level of pedagogical belief the teachers had in using the Web- tools.

- S2: I think it is manageable with user manual... I have gone through the Web tools. I have tried it at home... so simple I can manage it without any guidance. [3I4UB]
- S3: The Web tools is very useful to me, it is easy to contact my student an also I can give them homework and also upload my notes and also it is very useful. [1I3UC]
- S8: Yeah of course it is a very simple method for me and it should be adopted in all the schools. [2I5RH]
- S6: Yes, exactly, I always give them (students) the examples of website which is related to mathematics, so I think if you have internet at home and so on, it would be useful to practice questions and other schools question bank [3I5RF].
- S4: I think it is a very good idea... I think when we have the facility and all and I have time then I would like to use it [1I3UD]
- S10: I don't think is difficult it is only for teacher's part for first, I am learning the tool and after that it would not be a problem...for me I did by trial and error then I got contractand it is easy [2I5RJ].
- S5: I did not find any difficulty in any of those modules in the Web tools [3I5UE].

From the opinions of the seven teachers it was also evident that they were able to use the Web tools as an integral part of their teaching. However, S5, S8 and S3 faced problems during the Quiz and Web tools administration modules. Thus, only four out of these seven teachers at this stage were able to adapt and adopt the Web tools so as to facilitate teaching within their classroom and beyond. Some of the statements from the interviews with these four teachers showed how they view accepting the Web tools:

- S2: I think it is very convenient and very useful, there isn't much difficulties, so I find that it should be very effective to be taught in classroom. [1I3UB]
- S4: I think I don't have any problem lah it is just getting used to it lah. [3I5UD]
- S10: I don't think it is difficult, it is only for teacher's part for the first time learning the tool and after that it would be not a problem. For me I did by trial and error then I got contract and it is easy [2I5RJ]. I don't feel any difficulty- it is step by step - just follow it [1I5RJ]
- S6: This is new one to me, this is very good this is very beneficial to both side you know... to parents and teachers [2I4RF].

From the above opinions, we can notice that these four teachers were not only able to adapt to the Web tools but were also able to identify a means to apply it within their classrooms. These four teachers who were successful in integrating the Web tools and trying it in the classroom were also the teachers who could successfully journey through the entire Web tools without much problem. These teachers with the experience gained with commitment were able to modify and infuse technology as a tool in their classroom. However, it is quite difficult to estimate if such commitment and ability of the teachers to infuse technology was due to the additional knowledge these teachers had before their observations. Moreover, this has to be seen in the context of Shulman's argument (1986), which states that having knowledge of subject matter and general pedagogical strategies though necessary is not sufficient for capturing the knowledge of good teacher. Thus, Shulman emerged with a concept of blending content and pedagogy and named it Pedagogical Content Knowledge (PCK). Pedagogical content knowledge is a type of knowledge that is unique to teachers and is based on the manner knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach). Although Shulman did not discuss technology and its relationship to pedagogy and content, it was Punya Mishara and Matthew J. Koehler (2006), who blended technology with PCK (Pedagogical Content Knowledge) and emerged with a new approach, called TPCK (Technological Pedagogical Content Knowledge). This TPCK is a form of knowledge that expert teachers bring into use anytime while integrating technology with PCK. For example, in the case of Ms. Khalijah, during her observation session she mentioned that "I think yeah, everything I have learned in these six observations are good, but as I mention now there are few other things that you can do it to be more useful. For me, I'm a mathematics teacher so I need space for using formulae, I need something that can be used to do calculations and so on" [3I6RF]. From this statement, we can see that she is looking forward for more added features, in addition to what she had mentioned "good" after all her six observation sessions, thus we can see that there seemed to be a "knowledge quest" and an uplift in her Technological Pedagogical Content Knowledge (TPCK). Therefore, the four teachers who were able to infuse Web tools successfully without much hindrance and integrate it in their classroom teaching were those teachers who had sufficient TPCK, which seemed to have allowed them effectively to transform their subject knowledge effectively for the purpose of technology teaching.

Furthermore, this finding concurs with the model for the adoption of new technologies by Hooper and Rieber (1995). They proposed a model that consists of five specific phases: familiarization, utilization, integration, reorientation and evolution. At the familiarization phase, the teacher simply learns how to use the technology. At the utilization phase, the teacher

uses technology in the classroom but has little understanding of, or commitment to, the technology as a pedagogical and learning tool. During the integration phase, the technology becomes an integral part of the course in terms of delivery, learning, management, or other aspect of the class. In the reorientation phase, the teacher uses the technology as a tool to facilitate the reconsideration of the purpose and function of the classroom. Finally, teachers who reach the evolution phase were continually able to modify the classroom structure and pedagogy to include evolving learning theory, technologies, and lessons learned from experience.

According to Hooper and Rieber, many teachers progress only to the integration phase and do not transform their philosophical orientation of how learning can occur in the classroom through technology. From the various levels of attainment the teacher participants managed to journey through the Web tools, but showed that the lifespan of the majority of the teachers who were observed with the Web tools were able to progress only to the utilization phase and not as mentioned by Hooper and Rieber that many teachers progress until the integration phase. Looking into the levels of attainment of these teacher participants as a whole, it is worth noting that these outcomes were only based on the administration of Web tools which were designed based on Salmon's 5 stage model, which indicates how the tutor's role should also change in order to support and encourage the students as they progress through these 5 stages. Thus, these teachers who were observed with the Web-tool, which was designed based on the above Salmon's 5 stage model, were expected to journey through each stage of the Web tools as mentioned in the Salmon's 5 stage model. However, from the observation results only four teacher participants (S2, S6, S4, S10) seemed to have experienced in the manner Salmon defines his 5 stage model. Thus, we can see that the learning curves of the teachers tend to bend as they progress through different stages of Web tool. However, there can be many factors that influence the teachers in not effectively infusing the Web tools. Some of the predominant factors can be: i) no desire to adapt to new teaching style or ii) low level of self-efficacy or iii) the unwillingness to shift from traditional modes of delivery to Web-based teaching or iv) no conducive learning environment. Thus, it would be worth looking at the diagrammatic illustration (Figure 1.0), as to how this transition affects the teachers' level of attainments during the integration of technology in their classrooms using Web tools.

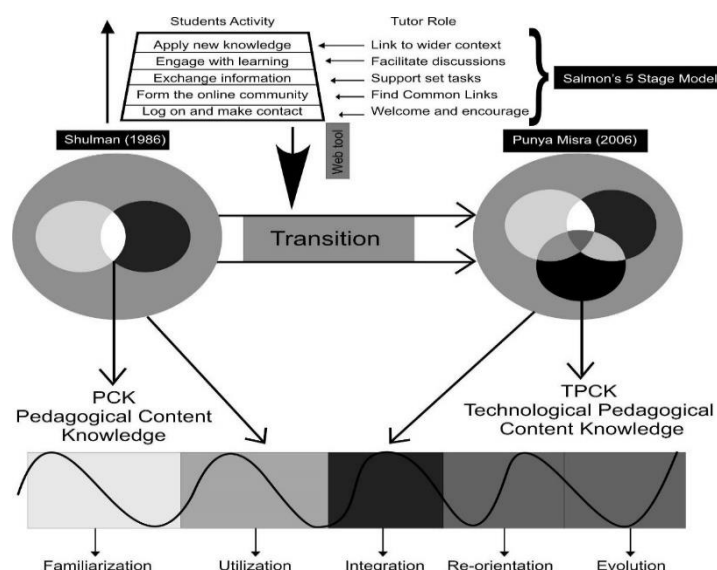


Figure 1.0: Technology Acceptance Model for Online Teaching

Conclusion

Technology acceptance model models how the users accept and use a technology. In this paper an attempt has been made using qualitative approach to develop a technology acceptance model for online users of pedagogical community. The development of this model has used theories incorporating Salmon's 5 stage model, TPACK and Hooper and Rieber models of adoption of technology. The result of this research has shown qualitatively that this model could serve as an eye opener for all those want to assess technology acceptance in the context of online integration of learning content, which in this case is could be MOOCs.

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