Instructional Engineering for Acceptance of Web 2.0 Technologies to Promote Critical Thinking

Mohammadali kianian, Jamalludin Bin Harun, and Fereshteh Ghazizadeh Ehsaei

Abstract—One of the major aims of science and technology instruction is to promote learners conceptual understanding and thinking skills. The main goal of this paper is to explain an e-Learning framework on the use of web 2.0 technologies to promote critical thinking skills with Decomposed Theory of Planned Behavior (DTPB) and Practical Inquiry Model (PIM) in educational environment. Technology application such as web 2.0 tools in the teaching and learning environment has increased over the past years, but majority of them are limited to content delivery. Using the Decomposed Theory of Planned Behavior (DTPB) allows us to uncover specific factors that influence the acceptance or use of new technologies to supplement in–class learning. In addition, the rapid growth of web 2.0 tools has made an increasing amount of information available. Students access different pieces of knowledge. Therefore, they must be aware not only how access information but also more significantly how to manage information, analyze, integrate, and evaluate into usable knowledge. Practical Inquiry Model (PIM) is the instructional process to guide online learners to higher levels of Bloom's Taxonomy to have them thinking and writing at the levels of analysis, synthesis, and evaluation.

Index Terms—Critical thinking, community of inquiry model, decomposed theory of planned behavior, practical inquiry model, and web 2.0.

I. INTRODUCTION

Researches in the past have indicated that technology application in the teaching and learning environment has increased over the past years, but majority of them are limited to content delivery .[1] Because of this, coupled with the appearance web 2.0 tools into daily life of student, they use and learn technologies differently from their parents and educators.[2] At different levels, in the programs for preparing future educators should make ready technology-rich experiences in every part all aspects of the instructing.[3] In addition, the rapid growth of web 2.0 tools has made an increasing amount of information available. Learners no longer access the web only for course materials; in addition they access different pieces of knowledge, therefore students must be aware not only how access information but also more significantly how to manage information, analyze, integrate and evaluate into usable knowledge. Because of this development of critical thinking

Mohammadali Kianian and Jamalludin Bin Harun are with the Department of Educational Multimedia, Universityi Technologi Malaysia, Johor, Malaysia (e-mail: makianian@yahoo.com, p-jamal@utm.my).
Fereshteh Ghazizadeh Ehsaei, Department of Information Systems, Universiti Teknologi Malaysia, Johor, Malaysia (e-mail: fgh139@gmail.com).

become important in educational systems.[4] Therefore, in this study it is important to explore per-service teacher use of web 2.0 technologies to support critical thinking in pedagogical environment. The Decomposed Theory of Planned Behavior (DTPB) assert that behavior is a direct function of behavior intention and it as function of attitude, subjective norms, and perceived behavioral control. Using the Decomposed Theory of Planned Behavior (DTPB) allows us to uncover specific factors that influence the acceptance or use of new technologies to supplement in-class learning.[5] Practical Inquiry Model is the instructional process to guide online learners to higher levels of Bloom's Taxonomy to have them thinking and writing at the levels of Analysis, Synthesis, and Evaluation as a useful classification system to explain student behavior.[6]

II. RESEARCH BACKGROUND

The first generation of the internet technologies, also known as web 1.0 (read-only) such as e-mail, course websites, discussion forums, and news groups (lack of effective interaction and collaboration) have additional value and effective to traditional classroom learning materials delivery and design in many colleges and universities.[7] In the past decade, using blogs, wikis, podcasts and social network as a new wave of internet technologies, web 2.0 (read & write), has to provide more effective interaction and collaboration. The important attribute of these tools is user's active participation ;and examination for the ways of utilize web 2.0 in pedagogy systems has been started.[8] The rapid growth of information and communication technologies, researchers believe that web 2.0 has potential to further enhance in educational environment; in additionally increase interaction among students and teachers.[9] Now, the use of web 2.0 has become one of the greatly educational utilization tools for providing learning materials for students. Students enables to connect, gather information and create new knowledge that could be shared with others.[1]

As a citizen of the 21st century with the great impact of technologies on our individual and professional live, learn and work successfully in an information-rich and knowledge based society, learners and educators must utilize technology effectively.[10] today's students are thought as "Digital Natives"[11], "NET GEN" [12] that have grown up with digital technologies. They now are becoming available by the internet in a diversity of formats, and are considered to be more comfortable with new generation of web-based technology than previous generations.[12] Researchers have indicated that digital native use and learn technologies differently from their parents and educators.[2, 13] At

different levels, both professional progression program for educators currently in teaching and learning environment and programs for preparing future educators should make ready technology-rich experiences in every part all aspects of the instructing.[3] It is important to investigate pre-service teacher use of web 2.0 technologies to support pedagogical environment in higher education. The purpose of this study was to investigate pre-service teacher awareness of the potential of web 2.0 technologies to complete the teaching and learning classroom and using the decomposed theory of planned behavior as theoretical framework to investigate their acceptance of such technologies[5].

The rapid growth of Information and Communication Technology (ICT) has made an increasing amount of information available. However, not every piece of information is valid or reliable. People need to have certain critical thinking skills to analyze and assess information, construct arguments and be able to respect diverse perspectives in a world that depends largely on knowledge and inter-discipline.[14] The world is also changing tremendously fast and a great deal of uncertainty is involved. People can no longer rely on a single source of information to make proper judgment but have to view phenomena from different perspectives. Critical thinking thus becomes an essential competency for people in the new information age and the global economy society.[15-16] Practical Inquiry Model is the instructional process, which focuses on thinking processes versus personal learning outcome, can be used as a model to guide online learners to higher levels of Bloom's Taxonomy (Analysis, Synthesis, and Evaluation) as a useful classification system to explain student behavior.[6] Therefore, there is a need for web 2.0 e-Learning environment model to acceptance of such technologies and thinking process to guide online learners to analysis, synthesis, and evaluation information among pre-service teacher to teach Digital Natives learners. Using this model, pre-service teacher will understand more on how to use a new technology in their class and how to guide their learner to promote critical thinking in web 2.0 e-Learning environments.

III. Literature Review

A. Web 2.0

Web 2.0 refers to as the "read & write web" that online users could find, copy, create and share information with interactive services and they have control over their own data. It also expends the ways in which communication take place among users. This new generation of web-based technology that users work differently, no longer is it only 'find and use' data. They have more participatory, interactive format and everyone can post journals, photos, movies and more.[17] Blogs, wikis, social networking websites, such as Facebook and Flickr, social bookmarking sites, and 3D environments are examples of some web 2.0 tools as new generation of internet technology. These new technologies make wider participation in the creation of information which is shared and distributed mach easier than in the past. Web 2.0 application are being used to share and collaborate in social,

business, and instructional contexts.[18] as a matter of fact, with emerging this new technologies many companies have accepted web 2.0 application to encourage internal information sharing and cooperation by document sharing portals.[19] In the past decade, the rapid growth and popularity online social networks (Facebook, Fickr, and YouTube) for exchanging individual data, photos, videos, and the enhance required for useful and easily access means to foster generate, analyze, and exchange the increasing continually of information, only with the ease of use of web 2.0 platforms as interaction and collaboration tools, have encourage a large wave in the appearance web 2.0 technologies.[19] The increasingly ubiquitous access, ease of use, functionality, and flexibility of emerging Web 2.0 technologies have made them much more appealing as pedagogical tools. furthermore , applications of these tools can support instructional methods such as active learning, social learning, and critical thinking , by providing environments and technologies that promote and foster these interactions.[9]

B. Critical Thinking

Critical thinking is an essential competency in the new information age. As a universal academic phrase, critical thinking is "seldom clearly or comprehensively defined" (Petress 2004), but it is frequently considered one of the main aims in higher education. There are various definitions of critical thinking can be found in academic setting. For example, Ennis (1987) that explained critical thinking as "reasonable reflective thinking focused on deciding what to believe or do".[4] The fast growth of new technologies such as web 2.0 has made an increasing amount of information available. Therefore, not every piece of information is valid or reliable. Learners need to have certain critical thinking skills to analyze, management, and evaluation information.[14] But, study shows that student generally lack critical thinking skills. Malek [20], Warschauer [21], Lai [22] and Chiu [23] report that students in Asian countries or areas like Singapore, Hong Kong or Taiwan are often passive and quiet. They do not perform well in critical thinking and leadership.[9] Weblogs, social networking (for example Facebook) and discussion forums as Web 2.0 tools have the potential to develop learner's critical thinking, for they enable learners to publish data and information to a broader audience and hence learners have to take more responsibility and think in additional before they post.[24]

C. Decomposed Theory of Planned Behavior

The Decomposed Theory of Planned Behavior (DTPB) in Fig. 1 originated from Theory of Planned Behavior (TPB) that posited that actions are determined by a combination of people's behavioral intentions and perceived behavioral control. Both the Theory of Planned Behavior and the Decomposed Theory of Planned Behavior assert that behavior is a direct function of behavioral intention and both view behavioral intention as a function of attitude, subjective norms and perceived behavioral control. In the Decomposed Theory of Planned Behavior attitude, subjective norms and perceived behavioral controls are all decomposed into lower level of belief constructs.[5]

Using the decomposed model not only allows us to better understand the antecedents' relationship, but also it allows us to uncover specific factors that impact the adoption or use of new technology. Taylor and Todd showed that the decomposed model has better explanatory power over the Theory of Planned Behavior.[5] Therefore, this model will be selected to explain the acceptant intention and use of Web 2.0 technologies to supplement in-class learning by lecturers and students.
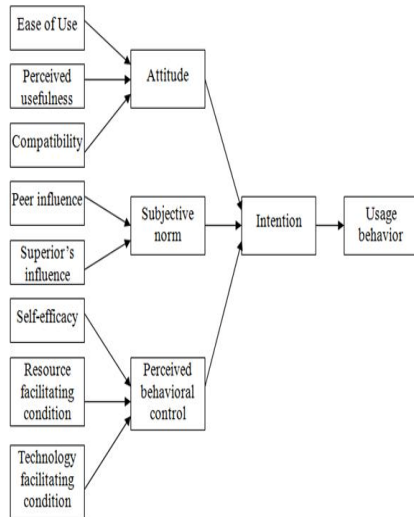

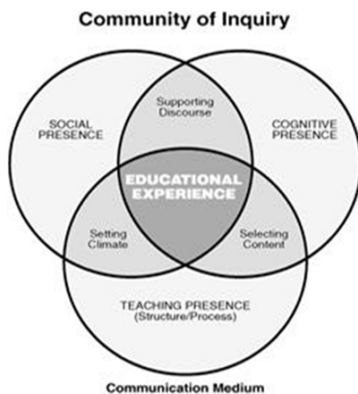Fig. 1. Decomposed theory of planned behavior.

Fig. 2. Community of inquiry

D. Community of Inquiry

Cognitive growth and development of the personal learning is increased through a socially interactive learning environment and that exposure to opposing issues of view has a motivating impact on a personal construction of information Vygotsky[25], Resnick [26], Rogoff [27], explained the generation of information is encouraged by the social environment that it is experienced. Cooperative constructivist method of Dewey to teaching and learning through critical thinking is recognizable that learning happens in social and individual world. All of us learn from each other as well as by our personal life experiences[28]. Community of Inquiry as the conceptual framework is based on Dewey's reflective inquiry method to learning.

According to Garrison that explained critical thinking is "a process and outcome that is frequently presented as the ostensible goal of all higher education" and improved a Community of Inquiry model in Fig. 2 to lead computer-mediated communication (CMC) to develop

critical thinking. The Community of Inquiry model is a conceptual framework that describes the elements that are essential prerequisites for a prosperous for higher educational experience. They interpreted that deep and meaningful online learning take place by the interaction of three elements: social presence, cognitive presence and teaching presence [29]. Cognitive presence is the most important and core aspect of Community of Inquiry model, which is operationalzed in practical inquiry model; based on Garrison explained it "reflects the process and the means to create cognitive presence"[6].

E. Practical Inquiry Model

The Practical Inquiry Model in Fig. 3 is an instructional model which has as its theoretical basis the works of Dewey (1933), Knowles (1970), Piaget (1969), Vygotsky (1978) and others. This model is a pedagogical process to guide online learners to critical thinking or higher levels of Bloom's Taxonomy. To have them thinking and writing at the levels of Analysis, Synthesis, and Evaluation, which has long been recognized as a useful classification system to explain online learner behavior.[6] This model is a four phase model involves triggering event, exploration, integration. The first phase is Triggering event. It is demonstrated as some issue, problem that require to resolution or for further inquiry; second phase is exploration. It is explained the looking for related date that can prepare understanding into discourse; third phase is integration. It is learners construct meaning from the connecting ideas in the looking for appropriate description, and last phase is resolution is founded by way of selection and examination of the most appropriate answer. All phases of practical inquiry model, learner change of position between the personal, meditative world of the personal and social exploration of ideas.[6]
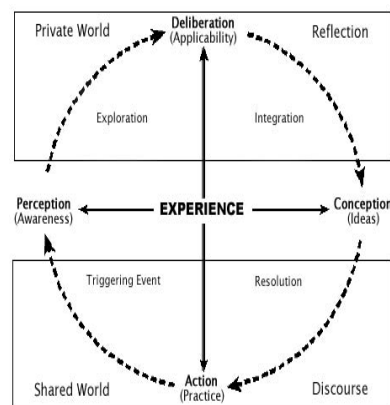

Fig. 3. Practical inquiry model.

IV. NEW E-LEARNING FRAMEWORK

The main goal of this paper is to explain a new e-Learning Framework Fig. 4 on the use of web 2.0 technologies to promote critical thinking skills with Decomposed Theory of Planned Behavior (DTPB) and Practical Inquiry Model (PIM) in educational environment.

The use of web 2.0 tools as internet technologies has significant potential to support and enhance teaching and learning environment. At this time, for profit organizations are utilization web 2.0 technologies to foster work

collaboration. Now it is up to use these technologies to effectively support and enhance their education.[9] With the emergence of web 2.0 tools into the everyday life of students, some of them have been primarily limited to content delivery, such as accessing course materials. Because of this, using the Decomposed Theory of Planned Behavior allows us to uncover specific factors that influence the acceptance or use of new technologies to supplement in-class learning.[5]

The fast developments of web 2.0 technologies have made an increasing amount of information available. Learners assess different pieces of information. However, not every pieces of information is valid or reliable. Student need to have certain critical thinking skills to analyze, integrate, and evaluate information.[4] Practical Inquiry Model (PIM) as instructional strategies is a pedagogical process to guide online learners to critical thinking or higher levels of Bloom's Taxonomy in analysis, synthesis, and evaluation, which has long been recognized as a useful classification system to explain online learner behavior.[6]

Fig. 4. E-Learning framework.

V. CONCLUSION

The new information age critical thinking is a critical phrase in teaching and learning. Weblogs, social networking, and discussion forums as Web 2.0 tools have the potential to develop learner's critical thinking, for they enable learners to publish data and information to a broader audience and hence learners have to take more responsibility and think in additional before they post. However, some of these tools have been primarily limited to content delivery, such as accessing course materials. The Decomposed Theory of Planned Behavior as the theoretical foundation allows us to uncover specific factors that influence the acceptance or use of new technology to supplement in-class learning.

New information age with web 2.0 tools as internet technology has made a huge amount of information available. But, all information available isn't valid or reliable for students. The Practical Inquiry Model is an instructional process to lead online learners to critical thinking or higher levels of Bloom's Taxonomy. To have them thinking and writing at the levels of Analysis, Synthesis, and Evaluation, which has long been recognized as a useful classification system to explain online learner behavior.

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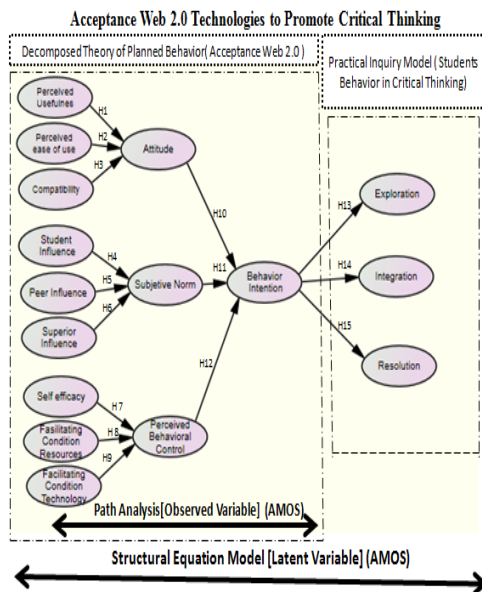
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Mohammadali kianian is a 3rd year PhD student at the department of Educational Multimedia in faculty of Education at Universiti Teknologi Malaysia. His research interests are: web technology om instruction and learning, online learning, multimedia communication system education and distancde learning. He has a Msc in educational management from islamic azad university of iran and a BSc in management and education planning from islamic azad university of Iran.

Dr. Jamalludin bin Harun is Assoc. Prof at the department of educational multimedia in faculty of education at Universiti Teknologi Malaysia. Hisresearchinterests are:….. he has his Ph.D in Educational Technology from Universiti Teknologi Malaysia and MSc in Educational Media & Computers from Arizona University and BSc in Chemistry from Universiti Teknologi Malaysia.

Fereshteh Ghazizadeh Ehsaei is a PhD student at information system department of university technology malaysia. Her research interests are e-learning, development of web based systems and use of web tools in education. She works as a senior lecturer at Shahid Bahonar University of Iran. She has a MSc in Information technology management from Amirkabir University of Technology in Iran.