Technology Supported Cities and Effective Online Interaction for Learning

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Abstract

Technology supported cities providing for a better interaction learning environment in learner-content, learner-instructor and learner-learner interaction are seen a notable factor for successful learning. Therefore, the objective of the study is to examine the types of interaction and its relationship with students’ level of satisfaction whereas a descriptive statistics analysis is adopted. A questionnaire was distributed to a hundred and fifty working adults who have enrolled at the University Technology MARA Distance Learning Program. A positive interactive learning environment result will have enormous impact on the quality of teaching and learning through effective interaction.

Keywords: Technology; interaction; learning; environment

1. Introduction

Technology supported cities are to support technological innovation in modern societies and becomes the intrinsic part for city dwellers. The most effective measure of regional inventive capacity, in terms of its effect on technology and productivity growth is the share of the workforce engage in creative activities (Lobo et al, 2014). In fact, it is a key ingredient to promote creative activities and learning is to provide internet accessibility that act as a catalyst for greater social interaction and information retrieval.
(Noorriati Din et al, 2013). An article by Boyd Cohen of Fast Company define smart city as cities which use information and communication technologies to be more effective and “intelligent”. He identified ten cities in the world as smart cities. These cities include; Vienna, Toronto, Paris, New York, London, Tokyo, Berlin, Copenhagen, Hong Kong and Berlin (Cohen, 2012). The term city is define based on the population size and its population density (Dijkstra and Poelman, 2012). In this paper the term technology supported cities or technology supported environment or smart cities will be used interchangeably.

In Malaysia, it is reported that the capital city of Malaysia, Kuala Lumpur, has an average broadband speed test above the national average, with an average speed of 5.99 Mbps. The top three locality with the highest broadband speed include Bandar Baru Bangi (22.4 Mbps), Damansara (7.36 Mbps ) and Setapak (6.96 Mbps). The broadband speed is low compared with countries such as Hong Kong (60.17 Mbps) and Singapore (38.83 Mbps). However, accessibility rate to broadband in Malaysia is high which is reported to be at 66% of the total Malaysian users (MOSTI, 2012). At present, the Malaysian government has allocated more funds to improve the information and communication technology (ICT) infrastructure in the 2013 Budget (Avanti, 2013), in order to improve technological support for citizens. This is one of the country’s initiatives, to develop and strengthen the cities in Malaysia, to be more connected in a technology supported environment.

Computer technology has enabled a new way to delivered educational learning activities from traditional learning environment to technological learning environment. One such form of learning is online distance learning which use internet technology as the mode of delivery. Currently, distance learning has been a popular mode of learning for working adults. Working adults are able to attend to their studies without leaving their job. In lieu of the limitation places to study in the higher institutions, the distance learning is a panacea to the problem. Distance learning has provided a platform for the learners to discuss online. It enables learners to connect and communicate, to exchange news and information with a global audience. On that note, the role of internet in the learning environment was widely utilized in many studies regarding to its usage (Sun et. al, 2003; Liccardi, et.al, 2007). The studies also showed that it can support communication and interaction between learners and their peers, and between learners and their instructor virtually.

1.1. Background of the study

Interaction is an activity based on a mutual influence between two or more people or a reciprocal action through which people can retrieve, use, share and store valuable knowledge (McShane and Von Glinow, 2010). Technology supported facilities will activate learners interaction between individuals in the system. In addition, the technology supported facilities will facilitate the threefold types of interaction as stated by Moore (1993). Moore’s interaction is a critical component of learning experiences for a distance learner. In fact, interaction is significantly in both conventional and distance learning environments (Liu, 2008). Consideration of how interaction needs translate into decisions about instructional design and development is critical as well. In any communication and interaction to take place, the ability to induce learning instruction is considered to be a critical competency. On that note, addressing the communication and interaction skill of both the learners and instructors are essential for a distance learning program to remain successful in its implementation and application.

1.2. Moore’s types of interaction

Moore developed three categories of interaction way back in the year 1989. The three categories with some additional are still being used by researchers to evaluate online interactions till now. Moore’s interaction concept is useful to analyze different types of interaction that might impact the level of
satisfaction and academic achievement of the distance learners. In this study, Moore’s three types of interaction will be used to describe the degree of interactions namely the learner to content or educational interaction, learner to learner or collaborative interaction, and learner to instructor or interpersonal/social interaction. Interaction is part of the learning process. Moore further suggested that in order interaction to take place there are three levels of different interaction. Moore’s three types of interactions that are important for learning can be classified as:

- Learner-content Interaction
  Learner to content (academic) interaction happens when learners access online materials and receive task-oriented feedback from their facilitator (Swan, 2003). It is a type of interaction that learners have with the actual course materials or content of an instructional website such as text, videos, photos and graphics, or forms to fill out. In online distance learning, the content is embedded in the web in the form of graphic pdf or internet html. The content must be prepared and written in simple language with clear learning objectives and instructions so that students will enjoy reading it and able to understand the meaning. The quality of interaction with the content is especially important for successful learning. Therefore, careful selection of course materials and online forum activities instructions is important.

- Learner-learner Interaction
  Learner to learner interaction is a situation to give learners the opportunity to interact among them in a more collaborative way. The purpose is to grant a sense of direction in their learner to learner interaction that will increase engagement in their learning, and will allow collaborative problem solving (Curtis and Lawson, 2001). Collaborative learning can have a positive impact on learning primarily for problem-solving activities (Brindley et al, 2009). Collaborative interaction can allow knowledge sharing (Noorriati Din et al, 2012) such as a shared understanding of the courses attended.

- Learner-instructor Interaction
  Learner to instructor interaction (Interpersonal/social) refers to learners receiving feedback from instructors. The relationship that occurs in this type of interaction is between learners and course instructor intended to support and facilitate learners understanding. The instructors’ skills in demonstrating, modeling, questioning, and assisting learners have a tremendous impact on the learning experience. Therefore, the instructors must be well trained in the area of the subject matter, the skills to use the internet technology and the competencies to communicate and motivate online. It is much like the traditional learning setting where learner to instructor interaction is done face to face whereby the online distance learning it is transmitted via electronic means (Thurmond and Wambach, 2004).
1.3. Statement of Problem

Bernard et al (2009) did a thorough research on distance learning and computer interaction, and was able to identify that the importance of the three kinds of interaction in distance education. However, they were unable to make sense out of the relationship among the three tested specific claims about interaction in the way that the current review has done. Therefore, the gap here is to further study the relationship between the learner-content, learner-learner and learner-instructor interaction to strengthen the assumptions made on the three types of interaction. The findings will add value to the body of knowledge in the distance learning field.

1.4. Research questions and objectives

This study was constructed with the intention to provide the basis for measuring the performance of interaction from the distance learners’ satisfaction perspective. This measurement would reflect the technology supported environment effectiveness expectation towards online interaction of distance learners. As such the research questions are:

- What are the types of interaction that exist in the distance learning interaction?
- What are the levels of students’ satisfaction on the program?
- What is the relationship between the types of interaction and students satisfaction?

Meanwhile the objectives will include:

- To determine the types of interaction that exists in the distance learning interaction.
- To determine the level of students’ satisfaction on the program.
- To determine the relationship between the types of interaction and students’ satisfaction.

The three types of interactions form the framework design for this study. The conceptual framework in Fig. 1 can be used to evaluate, identify and describe successful distance learning that reveal a rewarding aspect of learners interaction in the distance learning realm. The Fig.1. Depicts that the independent variable is the types of interaction and dependent variable is the level of satisfaction.

![Fig. 1. The conceptual framework of the study](image-url)
2. Literature Review

The theory of distance education was coined by several distance learning experts, and Holmberg is one of them. Holmberg theory (1986) on the “guided didactic conversation,” falls into the general category of the communication theory. Holmberg theory had an explanatory value on teaching effectiveness, the impact of feelings of belonging and cooperation and the actual exchange of questions, answers and arguments in mediated communication. Holmberg had offered seven assumptions for his theory which include:

- The core of teaching is interaction between the teaching and learning individuals. Simulated interaction through learning materials can take over part of the interaction by causing students to consider different views, approaches and solutions and interact with the course in general.
- Emotional involvement between the teaching and learning parties (Craig et al, 2004) are likely to contribute to learning.
- Learning pleasure supports student motivation.
- Participation in decision-making concerning the study is favorable to student motivation.
- Strong student motivation facilitates learning.
- Didactic communication in the form of two-way traffic between the teaching and learning parties must be practiced.
- The effectiveness of teaching is demonstrated by students’ achievement.

The latest research on the interaction in learning include research by Cachioni et al (2014) and Thoms et al (2014). Cachioni et al (2014) stated that one of the factors for adults to continue learning is the social interaction that occurs in the learning environment. Cho et al (2014) study highlighted the role of the instructor to support interaction for the learners. They found that online instructors' support for interaction had a significantly positive influence on students' behavioral and emotional engagement. Taye (2014) describe the value of online interaction. He stated that the online interaction improve students' engagement when they are engaged in academic activities. Kimber and Wyatt-Smith (2010) stated that using online learning programs enable students and teachers to create new knowledge and improve academic performance. Tsai et al (2013) describe the benefits of feedback in online learning environments. He stated that the feedback from instructors to students can develop students' collaborative skills and regular learning habits. Clearly, interaction is the essence of effective learning. Some of the key terms that define interaction appear to be classified as an active engagement, the creation of knowledge, and feedback.

3. Methodology

The methodology approach is quantitative, and a simple descriptive statistical analysis is used. The primary data is collected through a survey instrument distributed to 150 participants that were designed for this purpose. The item’s survey were adapted from the research instrument used by Noorriati et. al (2012). The survey instrument was distributed in the classroom. The students were chosen randomly, where only those who are registered students can participate. A number of 71 completed survey forms were collected to represent almost 50% of response rate. The participants were selected from learners who had registered in distance learning program conducted by the University of Technology MARA (UiTM) Shah Alam, Malaysia. They were from the Faculty of Administrative Science and Policy Studies. The selection of the program is because it is one of the earliest programs being conducted in distance learning mode and among the most number of student enrolment in the program. Figure 1 demonstrated the conceptual framework for the study.
4. Findings and Analysis

The gathering data was tabulated using the Statistical Package System Software (SPSS). The details of 71 students participated in this study were recorded through the survey instrument gathered. The demographic profile of the respondents is analyzed as to get a better understanding on the characteristics of the respondents. Analysis of gender says that from the sample size of 71 respondents, 47 are female, and 24 are male. The mean for age is 28 years. The findings on the three types of interaction, namely Learner-content interaction, Learner-instructor interaction and Learner-learner interaction is summarized below. The illustration in Table 1 showed the descriptive statistics on the three types of interactions. The sample size is N=71. The learners to learners’ variable mean score is 6.2. This score reflects that there is a high level of interaction among the learners. Any score reported between 5.3 - 8 is considered high level of interaction. Interaction between learners and content also scored a high level of interaction. The mean score was 25 and according to Table 2, it showed a high score. The last type of interaction is learners to instructors that is 9.2. This variable also showed a high score like the other variables.

Table 1. The mean score for each type of interactions.

<table>
<thead>
<tr>
<th>Types of level of interaction</th>
<th>min</th>
<th>max</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners to learners</td>
<td>4</td>
<td>8</td>
<td>6.2</td>
</tr>
<tr>
<td>Learners-content</td>
<td>17</td>
<td>32</td>
<td>25</td>
</tr>
<tr>
<td>Learners - instructors</td>
<td>5</td>
<td>12</td>
<td>9.2</td>
</tr>
</tbody>
</table>

The scale to measure the level of interaction for the three types of interaction is as follows:

Table 2. The Scales of measurement

<table>
<thead>
<tr>
<th>Types of level of interaction</th>
<th>High Level of interaction</th>
<th>Medium level of interaction</th>
<th>Low level of interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners to learners</td>
<td>5.3-8</td>
<td>2.8-5.2</td>
<td>&lt;2.7</td>
</tr>
<tr>
<td>Learners-content</td>
<td>21.3-32</td>
<td>10.4-21.2</td>
<td>&lt;10.3</td>
</tr>
<tr>
<td>Learners - instructors</td>
<td>8-12</td>
<td>4-7.5</td>
<td>&lt;3.9</td>
</tr>
</tbody>
</table>

4.1. Level of Satisfaction

There were 24 items to rate the level of satisfaction among the students on the distance learning program. The score recorded a mean of 75.4. The mean shows that the level of satisfaction is high yet, it is 20 points below the highest score in the high level. Therefore there is still much room for improvement.

Table 3. The score for Level of satisfaction

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>min</th>
<th>max</th>
<th>mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of satisfaction</td>
<td>48</td>
<td>94</td>
<td>75.4</td>
</tr>
</tbody>
</table>
Table 4. The measuring scale

<table>
<thead>
<tr>
<th>Level of satisfaction</th>
<th>High Level of Satisfaction</th>
<th>Medium Level of Satisfaction</th>
<th>Low level of Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>66-96</td>
<td>33-65</td>
<td>&lt;32</td>
</tr>
</tbody>
</table>

4.2. The relationship between the types of interaction and level of satisfaction

To test the relationship between the types of interaction and level of satisfaction, Analysis of Variance (ANOVA) was utilized. The results are tabulated in Table 5. The result shows that there is positive significant relationship for the three types of interactions and level of satisfaction. The recorded score of the p value for learner to learner is .000, the p value for learner to content is .034 and the p value for learner to instructor is .000.

Table 5. Results of the ANOVA test

<table>
<thead>
<tr>
<th>Types of level of interaction</th>
<th>Mean square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners to learners</td>
<td>1.7</td>
<td>1.90</td>
<td>.000</td>
</tr>
<tr>
<td>Learners-content</td>
<td>16.1</td>
<td>5.99</td>
<td>.034</td>
</tr>
<tr>
<td>Learners - instructors</td>
<td>4.65</td>
<td>4.93</td>
<td>.000</td>
</tr>
</tbody>
</table>

5. Discussion

Discussions of this study will focus on three areas which are, satisfaction, interaction and participation.

- For student’s satisfaction, the level of interaction must be high.

  Students’ feel satisfied if the instructors would answer their questions in less than 48 hours. They understand better when there are active interactions. These interactions include discussions on important topics of the course. In addition, the instructor must be competent in skills to motivate the online learners. Bear in mind that the distance learners study by themselves, and this can be a very lonely situation. Therefore, interactions must be consistent, and interactions must also be among peers. There must be a virtual learning environment where discussion can continue as well as academic work can go on such as “search for scholar articles”, discussions on assignments, revisions and review of the articles can be done online.

- There is a positive relationship between satisfaction and types of interaction.

  This correlation that is positive shows that the two variables that is satisfaction and types of interaction are interrelated. Therefore, for this study, it is safe to conclude that the relationship is important and the types of interaction have a strong influence on satisfaction. However, due to the small sample size, this findings would not be generalized.

- Technology related learning environment can enhance learners’ participation.

  Participation in a learning environment is important. Some students prefer to observe and read the discussions which were posted either by their instructors or peers, instead of participating in the discussions. Observation on the online learning environment shows that some learners are in awe that they will be ridiculed if they type the wrong answer or ask the wrong questions online. Perhaps, this is a phenomenon that many instructors face when they teach online. Due to the reason, some instructors will communicate through email or the telephone to “break the barrier” between the instructors and the learners so that learners will be more comfortable to communicate online. This is one of the initiatives to have more students to participate voluntarily. All this can be materialized if there is an effective infrastructure to support technology related learning environment.
6. Conclusion

In conclusion, for technology related learning environment such as online distance learning, quality interaction and collaborative learning are very important. In this learning environment, the learners may not know each other as they are virtually connected, therefore there must be initiatives from the education provider to support and stimulate teamwork among the learners so that they will be able to interact more, and experience a richer learning environment. Teamwork can be enhanced by teaching and learning strategies such as promoting group assignments and group work and initiate team discussions through the internet application. Learners’ must be supported by lecturers and steered to maintain common learning interest among them thus enable themselves to collaborate and learn together better. Therefore, active participation of interaction from both the instructors and learners are encouraged so that the learning become meaningful and reflect the relevance of the technology supported environment.

Interaction between learners and instructors are essential. The instructors need to be trained with the expertise in using the technology as well as teaching skills that are suitable for online learning. Communicating through emails and chat platforms must be well planned such as learning objectives must be clearly communicated as well as initiating questions and answers discussions among the instructors and learners. In addition to that, there must be some form of motivational messages being communicated online to further support the students’ learning. Such support can be done by words of encouragement and delivering short messages on study skills.

Interaction between learners’ and content is important, more crucial is that the content must be designed with instructions and activities so that the learners are able to self-learn by using the content. The content need to be developed by instructional designers and content experts, it has to be tested before it can be uploaded into the learning environment. For adult learners, the course content must allow them to self-learn as most of them are working adult learners. The learning process will give a greater understanding on the course contents, the three types of interaction seems to be a critical role for this learning process to succeed. Therefore, this interaction relationships can be the contributing factors to learning outcomes as well as completion of the study. It is suggested that researchers need to further the study in this area via different perspectives such as cultures, to study the interaction of students doing quantitatively based program and science and technology programs. The different perspectives are to observe findings and to make a comparison as to give more robust details in the implementation and application of the distance learning realms.

Finally, technology supported environment/cities or smart cities not only enhance learners learning but also learners’ participation and motivation. The availability of the internet technology, learners become motivated to participate in online learning. This is because, the technology supported environment with internet accessibility in placed, it allows learners to pose questions for learning at any time and any place according to their pace. This type of learning is much accepted and supported by the working adults as it gives them the autonomy to decide when to learn and what to learn. The decision when to learn and what to learn pose the characteristics of adult learners. The technology supported environment not only motivate learners’ participation but makes learning more self-directed as they only need to interact with their peers or instructor virtually for valuable information. Thus, technology supported environment have more meaningful effect in the learning interaction settings and become a salient factor for the success of adult learners.
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References

Cachioni, M., Ondonez, T. N and Lima da Silva, T. B. (2014). Educational Gerontology. 40(8); 584-596
Cohen, B (2012). “What exactly is a Smart City?,” Retrieved fromhttp://www.fastcoexist.com/1680538/what-exactly-is-a-smart-city,