Technological Affordances of E-Learning: An Analysis of Students’ Perceptions in Tertiary ICT Education


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Abstract

In this article, we attempt to investigate the affordances of e-learning in supporting tertiary teaching and learning. Using an interpretive qualitative study, we analyzed a total of 46 students from three different programme, namely Chemistry, Physics and Mathematics education through questionnaires and interviews. The findings revealed that students’ views were generally positive towards the technical aspects based on technology and tools used in the e-learning environment, the pedagogical aspects of e-learning approach involved, and the social aspects of e-learning environment. However, while e-learning environment can help students to learn from one another in the class, it requires preparation in terms of technology and tools, collaborative learning tasks, and collaborative learning approach. Thus, this article also offers practical suggestions for implementing teaching and learning with e-learning within a tertiary classroom.

Key Words: E-learning system, Moodle, ICT education, Pedagogical approach, Tertiary context

1. Introduction

Many universities both in Malaysia and abroad are enthusiastically embracing some sort of e-learning system in teaching and learning, at either or both undergraduate and graduate level [1][6][19][20]. However, teaching and learning via e-learning system requires a different teaching and learning strategy to that of traditional classrooms, in which the instructor has all the control [2]. Simply providing students with online access to e-learning materials and replicating a classroom model of teacher-centered learning is inadequate [6][7][8]. Research advocates that e-learning should move towards a model of student-centered learning in which it must take into account not only the technical aspects of e-learning but also the social and pedagogy of learning [7][8][13]. The emphasis is on e-learning through an active social process rather than a passive process of knowledge acquisition, where knowledge is fostered through interactions and collaborations [3][19][20]. Therefore, this study is conducted to investigate students’ perceptions on the affordances of e-learning in supporting learning in a conventional Malaysian tertiary classroom based on three important aspects as reported in the literature, namely technical, social and pedagogy.
2. Background and related work

Learning through e-learning methods, specifically through the use of ICT, has increased formally and informally in schools, colleges and universities throughout the world [11]. This situation arises due to several factors. First, the coverage of Internet connectivity is widening, so permitting greater access to the Internet. To-date the number of Internet users that have Internet access has raised to 34.3 % of the world’s population, or roughly 2.4 billion persons [9]. This number shows that there has been a substantial growth in Internet usage each year which has led to extensive use of Internet applications (e.g. email and computer conferencing) for the exchange of information and knowledge in education [11]. Second, the emergence of web 2.0 as a result of the advancement of web technologies has had a great influence on e-learning applications [14]. In this regard, the use of open educational resources has flourished in that it provides educators with tools to create and share their works [14]. Wikis, e-books, blogs and social networking websites are some examples of open educational resources embedded in web 2.0 that are widely used in education. The engagement of students with open educational resources has led them to be exposed directly or indirectly online [14]. In fact, many of the students have become involved in the social networking activities that require them to communicate, interact and broadcast casual information and knowledge [14]. Kirkwood [14] described the key motive of ICT (or e-learning) being adopted in tertiary education as to facilitate what he called “pedagogical function(s)” (p.108). Pedagogical function, according to Kirkwood [14] is an application, tool or system that can be used to execute presentation, interaction, dialogue or generative activity.

Garrison and Anderson [5] have argued that new communication technologies that have been predominantly adopted in e-learning have the potential to change the nature of the teaching and learning transaction in higher education. The transformation brought by e-learning would extend conventional approaches in terms of its delivery efficiency or its entertainment value [5]. However, there are critics of the use of technology in the teaching and learning transaction; they believe that technology (e.g. e-learning) can have a contextual influence on learning [5]. The notion of learning through online methods has always been associated with distance education. This is particularly due to communication and interaction held at a distance. Mason and Rennie pointed out that e-learning represents a fundamental shift in distance education, where it moves into the “third generation” of distance education [14]. The teaching and learning transaction as it is now can be as rich as it would be in face-to-face, campus-based settings [14]. E-learning provides an alternative to the shortcomings of
distance education particularly from the aspect of face-to-face interactions, and provides many more opportunities for dialogue compared to print or broadcast-based distance education.

Although learning in distance education could sometimes occur through online methods, the tools and scope of e-learning is much wider than online learning. In the literature, the term “e-learning” sometimes is used interchangeably with “online learning”. However, both terms could denote quite different technologies and applications. For instance, e-learning applications could be also referred to as the use of stand-alone learning packages (e.g. CD-ROM) and interactive web-based packages [8]. It is also noted that the use of e-learning applications can extend to distance learning that uses audio and video as well computer delivery modes (or Internet) [11]. This is slightly different with online learning, where learning activity is normally conducted through Computer-Mediated Communication (CMC) or web applications that are using the Internet to deliver or support learning activity [15]. The difference in meaning that the terms hold is due to the fact that each research study has a different emphasis. Some researchers place emphasis on the content, some on communication, and some on technology [11].

The Joint Information System Committee (JISC) defines e-learning as “learning facilitated and supported through the use of information and communications technology” [12, p.10]. According to Harasim [10], the e-learning technologies could be categorized according to their roles in learning. The e-learning technologies used in facilitating learning tasks are known as e-learning tool(s), while e-learning technologies used in facilitating learning processes are known as e-learning environments. The e-learning technologies are referred to as web tools that can facilitate or enable users to perform particular learning tasks in a learning activity. These tools can be web-generic specific (such as search engines, web browsers, email tools, productivity tools, graphic presentation tools, blogs, wikis, podcast-authoring tools, web-authoring tools, social networking tools and user-generated tools). Education-specific e-learning tools could include websites or portals with resources aimed at teachers, students or particular disciplines. For instance, websites that provides teachers or students with lesson plans, assessments, inventories, support or tutoring, learning content, and related teaching and learning links. However, Harasim [8] argues that e-learning technologies used as learning tools do not provide suitable “spaces” for conducting and facilitating collaborative learning, even though these learning tools offer potential enhancements to collaborative discourse and group conversation. But they are not shared
environments that are “able - in and of themselves - to support collaborative learning and knowledge building discourse” (p.98).

The research in this study is focused on a tertiary education context by which the tools and technology for e-learning environment are provided by the institution itself. As is the current trend, almost all universities throughout the world now have their own online learning system, and many have also shifted to a free and open e-learning environment (e.g. Moodle). Currently, there are 68,352 active sites that have registered in the Moodle site, representing 235 countries [16]. Most of the registered sites are educational institutions. The increasing use of Moodle as an e-learning environment in conventional tertiary institutions is of particular interest because it “promotes social constructionist pedagogy (collaboration, activities, critical reflection)” and is “suitable for supplementing face-to-face in-class teaching and learning” [3]. Moodle as an e-learning environment also offers support for a customized learning environment informed by a pedagogical model and framework to scaffold for particular learning processes [16].

3. Method

The study is guided by interpretive methodology that included the collection of quantitative and qualitative data [15]. Quantitative data was generated from questionnaires while qualitative data was generated via interviews with students.

3.1 Participants

A total of 46 students were involved in this study. The students participating in the research were Malaysian undergraduate pre-service teachers from Chemistry, Physics and Mathematics education programme and they were in the second year of their study. The teaching and learning in the course consisted of conventional face-to-face teaching lectures together with online participation through the university’s virtual LMS. The course ran for 15 weeks, comprised of 13 weeks of lectures, and one week each of mid-semester break and study week.

3.2 Instruments

In this study, a combination of quantitative and qualitative data collection was conducted. The key purpose of employing a combination of quantitative and qualitative methods is to acknowledge that each type of method has advantages and disadvantages and to allow the strengths of one method to enhance the data from the other methods [4]. This study employed
research instruments through questionnaire and interview.

3.2.1 Questionnaires

One of the advantages of using questionnaires is that the data is quantifiable, and so provided the quantitative data for this study. The questionnaire used in this study was organized into three parts (part A, B & C). Part A had eight questions on students’ demographics. The second part, B, questioned students’ previous e-learning (Moodle) experiences and included five open-ended questions. The last part, C, dealt with students’ perceptions of online experiences in learning and working in a group through e-learning (Moodle) structured using a five-point Likert scale from strongly agree to strongly disagree. Information from this survey helped to obtain a better understanding of the students’ backgrounds and also enhanced the interview. Items in each part of the questionnaire were analyzed to produce an overall reliability value of Cronbach’s Alpha. This study reported a 0.91 Cronbach’s alpha for the internal consistency reliability measurement which indicated that the items were reliable and consistent [12][15]. The questionnaire was also checked for content and language clarity before administration.

3.2.2 Interviews

In this study, interviews with students were conducted semi-structured in order to develop a reciprocal, dialogic relationship based on mutual trust, openness and engagement, in which self disclosure, personal investment and equality is promoted [15]. The interviews were scheduled according to students’ time availability and were audio-taped with the students’ permission. There were opportunities for clarification and discussion of any emerging issues in the interview. Probing questions were used to bring out more information and elaboration from the students and to allow the researcher to further examine the students’ views about their e-learning experiences. The students’ responses provided information about what they had gained through e-learning and their feelings about their roles and contributions.

3.3 Data analysis

In this study, data were collected based on students’ perceptions of their e-learning experiences on the aspects of technical, social and pedagogy. The technical aspect is referred to the e-learning environment and its components such as course content, forums, chat, instant messaging, coursework and assessment. The social aspect highlighted how learning activities in e-learning were socially shared or distributed by students. The pedagogy aspect
described any informal or formal instructions regarding how students were to work on learning activities in e-learning. Data for analysis included the online questionnaire that participants completed at the end of the course. The analysis was conducted using a one-sample, two-tailed t-test with the hypothetical mean score (test value) of 3.5 (which was selected to examine if students’ views were above moderately positive). Further analysis of data based on the post-course semi-structured interviews was conducted as well, regarding the students’ perceptions of their e-learning experiences of technical, social and pedagogy aspects.

4 Findings

In the following section, the presentation of data begins with the analysis of students’ perceptions on the aspect of technical first, followed by social and pedagogy. Data from the questionnaire is reported on first, followed by data from the interview.

4.1. Students’ perceived experiences of technical aspect of e-learning

The findings from the questionnaire of students’ perceptions of e-learning based on technical aspects are shown in Table 1. In general, the students’ responded with mean scores that ranged from the lowest of 3.80 (moderately positive) to the highest 4.55 (positive), regarding their perceptions of how e-learning helped their learning in general and learning in groups. Likewise, the students’ also responded positively by commenting that they had enjoyed learning online. However, the last three items, ‘I enjoy learning within an online group’, ‘I prefer to work online within a group rather than work alone’ and ‘I can connect with lecturers and other students outside the classroom at anytime and anywhere’ were varied in terms of responses from the students (p values were more than 0.001).

Table 1. Students’ perceived experiences of e-learning based on technical aspects

<table>
<thead>
<tr>
<th>Technical</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>eLearning helped me to learn on my own</td>
<td>4.03</td>
<td>0.69</td>
<td>4.76</td>
<td>.000*</td>
</tr>
<tr>
<td>eLearning helped me to learn online</td>
<td>4.18</td>
<td>0.54</td>
<td>7.76</td>
<td>.000*</td>
</tr>
<tr>
<td>eLearning helped me to learn in my group</td>
<td>3.98</td>
<td>0.80</td>
<td>3.75</td>
<td>.001*</td>
</tr>
<tr>
<td>eLearning helped me to share ideas or communicate within an online group</td>
<td>4.55</td>
<td>0.67</td>
<td>9.80</td>
<td>.000*</td>
</tr>
<tr>
<td>eLearning provided me with an easy way to get course learning materials</td>
<td>4.55</td>
<td>0.82</td>
<td>3.24</td>
<td>.000*</td>
</tr>
<tr>
<td>eLearning provided me with an easy way to get additional information and material for my assignment</td>
<td>3.93</td>
<td>0.79</td>
<td>5.59</td>
<td>.001*</td>
</tr>
<tr>
<td>I enjoy learning online</td>
<td>4.15</td>
<td>0.86</td>
<td>4.75</td>
<td>.000*</td>
</tr>
<tr>
<td>I enjoy online discussions about my studies</td>
<td>3.90</td>
<td>0.90</td>
<td>2.81</td>
<td>.000*</td>
</tr>
<tr>
<td>I enjoy learning within an online group</td>
<td>3.80</td>
<td>0.91</td>
<td>2.08</td>
<td>.044</td>
</tr>
<tr>
<td>I prefer to work online within a group rather than work alone</td>
<td>3.83</td>
<td>0.81</td>
<td>2.52</td>
<td>.016</td>
</tr>
<tr>
<td>I can connect with lecturers and other students outside the classroom at anytime and anywhere</td>
<td>3.85</td>
<td>1.05</td>
<td>2.10</td>
<td>.042</td>
</tr>
</tbody>
</table>

*Significant at p<0.05
Data from the students’ interviews revealed the opportunities and the affordances of e-learning as a tool to support learning. Students described that this e-learning provided them with accessibility to a wide range of online tools (e.g. forums, chat, instant messaging, quizzes and wiki), course content (e.g. course outline, lecture notes, readings/references and interactive resources), coursework where students are able to upload their coursework assignments, and assessment where students are able to track their learning progress by doing online quizzes and tests. Through e-learning, the students felt they were given the flexibility to learn not only in the class but also outside the classroom. This is reflected in the following student quote: “through e-learning, we are not only learning in the class but also outside the class. For example, for my class, we use e-learning to get the notes and have the discussion in the forum” (S1). Students also felt closer to their fellow peers and instructor because of the connectivity provided by e-learning. They felt that through e-learning they were able to build good relationships with their peers and instructor in an environment which was conducive to learning. A student explained: “in this situation, we can build good relationships with our lecturer and friends. When we know each other, it gives a positive environment so we enjoyed the class” (S2). In e-learning forum discussions, the communication delay between student posts gave them time to think and reflect before answering, as a student commented: “it is not like the report that the students do in the assignments, it is more like their reflection from the discussion in the forum which they conclude what they understand from the forum” (S3). The discussions were also retrievable at any time by students, because all posts made by students were stored in the system, which could then be viewed by all students in the class. A student stressed:

*The advantages of using group discussions in e-Learning are that all information that has been contributed will not be missing from the system. For example, if we discuss the topic among ourselves outside the system, there might be one or two points that we may leave out, but if we discuss it in e-Learning we can refer back the discussion by scrolling through the forum (S4).*

Despite the affordances of technology, serious issues were raised about Internet failure and availability, the remoteness of communication, the use of informal language and the impersonal nature of technology. These could potentially hinder students’ participation in the e-learning environment. Students reported that when the Internet connection was lost while they were posting their feedback, it affected their motivation to re-type it again. A student highlighted: “things will get worse when suddenly the Internet is disconnected. Then, we feel reluctant to type it out again” (S5). Similarly, students felt ignored when their peers were not online to answer questions. Another student expressed: “I like to discuss in the e-learning
environment, but when there is no one [online] to give feedback or comment on what we have posted, I feel like there is no point to post on the topic” (S6). The frequent use of colloquial language and informal local word abbreviations in discussions sometimes made it hard to understand what was being discussed, as reported by a student:

*Because the words are different from the formal words, when you pronounce them it sounds ok for us to understand, but when it is written, they become informal language and informal words which we totally don’t understand and this is discouraging* (S7).

The lack in online work of voice intonation and body language available in face-to-face interactions was seen to possibly result in misunderstandings. As a student commented: “I couldn’t sense the voice intonation from the lecturer and I didn’t know whether he was angry or not, but if it is in face-to-face, I can feel out the particular situation” (S8).

This section described how students perceived the aspect of technical of e-learning environment. The findings reported showed that in general most students enjoyed learning online but some of the students were less enthusiastic about online group discussion in e-learning. The next section describes students’ perceptions of the aspect of social of e-learning environment.

### 4.2. Students’ perceived experiences of social aspect of e-learning

Students’ perceptions of e-learning based on social aspects of e-learning environment are referred to how e-learning tasks are shared or distributed by the groups of students. The results from the questionnaire are shown in Table 2. In general, the students responded positively regarding collaboration and working together within an online group with mean scores of 4.0 and above. Students commented that it helped them learn more, learn efficiently, accomplish a higher quality work and build confidence. Likewise, the students also responded positively to their online group work, where they decided on their roles and responsibilities together.

<table>
<thead>
<tr>
<th>Social</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working together within an online group helped my learning</td>
<td>4.00</td>
<td>0.80</td>
<td>9.87</td>
<td>.000*</td>
</tr>
<tr>
<td>Working together within an online group helped me learn more efficiently than if I were working alone</td>
<td>4.00</td>
<td>0.64</td>
<td>11.23</td>
<td>.000*</td>
</tr>
<tr>
<td>Working together within an online group helped me accomplish higher quality work than if I were working alone</td>
<td>4.05</td>
<td>0.59</td>
<td>8.01</td>
<td>.000*</td>
</tr>
<tr>
<td>Working together within an online group helped me to build my confidence in expressing my ideas and thoughts</td>
<td>4.00</td>
<td>0.81</td>
<td>7.74</td>
<td>.000*</td>
</tr>
<tr>
<td>In my online group, the group decided how to work together</td>
<td>4.03</td>
<td>0.62</td>
<td>10.46</td>
<td>.000*</td>
</tr>
<tr>
<td>In my online group, the group members agreed about how to work together</td>
<td>4.10</td>
<td>0.67</td>
<td>8.20</td>
<td>.000*</td>
</tr>
<tr>
<td>In my online group, the way the group decided to work together encouraged group members to contribute</td>
<td>4.08</td>
<td>0.76</td>
<td>10.46</td>
<td>.000*</td>
</tr>
<tr>
<td>Knowing my role and responsibilities in the group task helped me feel that I</td>
<td>4.27</td>
<td>0.59</td>
<td>13.47</td>
<td>.000*</td>
</tr>
</tbody>
</table>
was contributing to the group
Knowing my role and responsibilities in the group task helped me feel a part of
the group

*Significant at ρ<0.05

Data from students’ interviews revealed that the social aspects of e-learning environment was seen by students as a way to learn to develop shared roles and responsibilities in a cooperative manner. A student explained: “we point out our opinions and we explain them. Then we ask one or two people to comment on it and the others will do the same” (S9). Students also supported each other through their willingness to share information and to remind other students to do the same. Another student said: “when we discuss we need feedback, so, by reminding them to participate in the discussion, we can get the feedback especially from those [students] who are always online” (S10). The frequent use of sociable words (e.g. idle and local talk), emoticons (or emotion icons) and personal posts which were not related to the topic of discussion, showed that students became more informal as they got to know each other. A student stressed “in the discussion, when people get to idle talk, they will contribute their opinion in a pleasurable way where they can enjoy the discussion and cheer up discussion” (S11). A further note on the social aspects of e-learning environment was the online group discussion roles, and the students were also asked about their perceptions on their roles in e-learning environment. Generally, students felt that through online group discussions they could help one another and have more focused discussions. A student reported on the roles of helping each other: “some people do help, because we did the discussion in a group. Yes, there are people who contribute great ideas that can help us in our studies” (S12). Another student highlighted the aspects of concentration in online group discussions: “online group discussions allow us to give more concentration on discussion because there are only a number of us. If there are only three of the members who replied to the post, it is easy for us to know” (S13). On the other hand, students reported the negative aspects of online group discussion, such as their working preferences, conflict among groups and inter-dependency issues. A student reported on the group work preferences:

We prefer to work outside eLearning because if we do the online group discussion we need everyone to get connected with the Internet at the same time. Usually, we do the group discussion outside eLearning, like what we did today, sit and gathered in this room and having a discussion (S14).

A student reported on the conflict among groups: “for them, we are like kids. They sometimes cannot accept our ideas or opinions if they are better than theirs” (S15). Another student highlighted the inter-dependency issue: “for me because we less interacts with other groups because we only discuss it in our group. That’s why our group just focused on our
group work without thinking about other group opinions” (S16).

This section described how students perceive the social aspects of e-learning designed for learning activities in a Malaysian tertiary classroom which they believed benefitted them in terms of helping one another complete the online collaborative learning tasks. The next section describes students’ perceptions of the aspect of pedagogy of e-learning environment.

4.3. Students’ perceived experiences of pedagogy aspect of e-learning

Students’ perceptions of e-learning based on pedagogy aspects of e-learning environment are referred to any informal or formal instructions on how they should work on the learning tasks in groups. The results from the questionnaire are shown in Table 3. In general, the students responded with mean scores ranging from the lowest of 3.55 (moderately positive) to the highest of 4.03 (positive), regarding their participation in online discussions, interactions with peers and lecturers, and their satisfaction of collaborating online. The lowest mean score of 3.55 indicated that students generally had responded positively towards their participation in an online collaborative group but some of the students were not used to this approach in sharing their ideas in an online group.

Table 3. Students’ perceived experiences of e-learning based on pedagogical aspects

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like participating and sharing my ideas in online discussions</td>
<td>3.98</td>
<td>0.92</td>
<td>3.26</td>
<td>.002*</td>
</tr>
<tr>
<td>My ideas were acknowledged by other students in discussions within an online group</td>
<td>4.03</td>
<td>0.57</td>
<td>11.2</td>
<td>.000*</td>
</tr>
<tr>
<td>I am willing to share and contribute my ideas in online discussions</td>
<td>3.55</td>
<td>0.95</td>
<td>-3.62</td>
<td>.001*</td>
</tr>
<tr>
<td>I was satisfied with the quality of work as a result of collaboration in my online group</td>
<td>4.03</td>
<td>0.57</td>
<td>11.2</td>
<td>.000*</td>
</tr>
<tr>
<td>Lecturers helped me in learning online</td>
<td>3.95</td>
<td>0.71</td>
<td>8.41</td>
<td>.000*</td>
</tr>
<tr>
<td>Lecturers guided me in working within an online group</td>
<td>3.95</td>
<td>0.67</td>
<td>8.86</td>
<td>.000*</td>
</tr>
<tr>
<td>In my online group work, the lecturer made the instructions for the task clear</td>
<td>3.96</td>
<td>0.77</td>
<td>7.67</td>
<td>.000*</td>
</tr>
<tr>
<td>In my online group work, the instructions given by the lecturer about how to work as a group facilitated the group task</td>
<td>4.00</td>
<td>0.63</td>
<td>10.4</td>
<td>.000*</td>
</tr>
</tbody>
</table>

*Significant at p<0.05

Data from students’ interviews revealed that the pedagogical aspects of e-learning were expressed through their participation in e-learning environment and mutual peer interaction in sharing information, following others’ arguments and justifying ideas. A student explained:

*It is the process on how to generate ideas because each group member’s free to give their opinions on particular issues; since each group member can give their own opinions on a particular issue or topic, we can see the positive and negative side of it. Then, we can choose which point is relevant to everyone (S17).*

Students also stressed that their participation in an online eLearning environment was an integral part of the institutional teaching and learning culture and that their participation was driven by assessment requirements of the course, as a student reported:
We have to accept the fact that participation in eLearning is written in the university learning policy. Also, the use of e-Learning has been a part of this university culture, so we have to participate in it. In my opinion, it will encourage more students to participate in it and contribute their ideas (S18).

The rules involved the process of negotiation in which students negotiated by comparing the advantages and disadvantages of solutions. There was also opportunity for students to contribute towards the co-creation of solutions. A student said:

_Sometimes, we cannot get all the information on one particular topic, so by combining all the information that we get from other people, we can get extra information about the topic. Even sometimes, when we couldn’t get the exact info about something, we could somehow relate it to the topic (S19)._ 

A further rule in this study was the online collaboration. Students were asked about their experiences of collaborating online to complete the learning tasks in e-learning environment. The students felt that sharing academic content through collaborating online with other students built up their confidence through exchanged ideas and opportunities for active learning. A student reported gained confidence: “we have to think critically on how to do the task together because when the lecturer asks to discuss in the classroom, we feel shy to do it, but if in e-Learning, we have a little bit of confidence” (S20). Other student reported exchanged ideas or shared expertise: “when we discuss and collaborate with other people that come from different majors, we can exchange our ideas” (S21), while another student highlighted: “capability and expertise that are shared benefit us” (S22). Finally, a student reported on the opportunities for active learning: “for me, the approach used in this course gave me some form of active learning… to learn the software in interactive activity” (S23).

Nevertheless, students also felt the negative aspects of learning through collaborating online with other students, such as other students not contributing their ideas, some not getting involved in serious thought and others dominating the discussion. A student reported that not all students contributed ideas: “in my opinion, it depends on the students themselves. Most of the students access the e-learning and might only read through the forum without contributing their ideas” (S24). Other student reported that not all students gave the topics serious thought: “when the discussion is getting serious, there are some people who start talking idle. They don’t think much actually” (S25). Another student highlighted the fact that some students dominated the discussion: “for me, it is not fair because there are more SPT [different course] students than us and they give a lot of opinions, which we just have to agree with”. 

This section described how students perceive the use of rules in activities designed for e-learning in a Malaysian tertiary classroom. The findings reported that students in general were comfortable and accepting of the need to work online through e-learning environment,
but that they had some reservations about sharing ideas where some of the students were not used to the approach of sharing their ideas in an online group.

5. Discussion

This study examined students’ perceptions on the affordances of e-learning in supporting learning in a conventional Malaysian tertiary classroom. The investigation analyzed the use of e-learning at three different aspects as recommended in the literature, namely the aspects of technical, social and pedagogy, but complementary to each other within the landscape of the situatedness of e-learning [24][25]. In general, the findings indicated that students’ views were generally positive towards the technical aspects of e-learning based on technology and tools used in the e-learning environment, pedagogical aspects of collaborative learning approach involved, and their social roles in the e-learning environment.

Specifically, the technical affordances of e-learning considered the analysis of e-learning tools and resources for participation in the course and how these affected students’ expectations from the course. The findings from technical aspects of e-learning showed that e-learning tools and resources afforded students’ participation and collaboration in the e-learning. The students said that they found the e-learning tools helped their collaborative participation, in which they were able to improve their knowledge in ICT and computer education. Data from interviews depicted that generally most students enjoyed learning through e-learning but some of the students were less enthusiastic about the application of online group learning facilities via e-learning. However, the students also indicated some constraints that potentially hindered their online collaboration participation in e-learning discussions, such as the lack of emotions and voice intonation, as well as the lack of feedback and the feeling of remoteness resulting from e-learning group discussions.

The social affordances of e-learning considered how students perceived their interactions with one another in supporting learning, and in particular how they perceived the e-learning tasks are shared or distributed. The findings reported that students in general were comfortable and accepting of the need to work online through e-learning, but that they had some reservations about sharing ideas where some of the students were not used to the approach of sharing their ideas in an online group. However, students perceived they benefited them in terms of helping one another complete the online collaborative learning tasks - a way to learn to develop shared roles and responsibilities in a cooperative manner.

The pedagogy affordances of e-learning considered how students perceived any informal or formal instructions on how they should work on the e-learning tasks or learning approach
used by the instructor in the e-learning system. The findings reported that the e-learning tasks (e.g. intra and inter-group work) that were designed by instructor to foster e-learning collaborations were helpful in framing students’ interactions with one another for learning. These findings were also consistent with the findings from the previous research indicated that e-learning environment used for collaborative activities was valuable in terms of helping the students accomplish goal and achievement (e.g. Harasim, 2012; Pallot & Pratt, 2005; Said, 2013). The findings from the pedagogical affordances of e-learning also indicate and suggest that effective e-learning environment can be implemented within a tertiary classroom. While e-learning environment can help students to learn from one another in the class, it requires preparation in terms of technology and tools, collaborative learning tasks, and collaborative learning approach.

5.1 Technology and tools

Since the e-learning activities in this study required online collaboration, the technology or tools that allow for e-learning interactions must provide students with quality Internet connections for accessing a wide range of online tools (e.g. forum, chat, instant messaging, quizzes and wiki) and course-related support (e.g. course outline, lecture notes, reading/references and interactive resources, the coursework and online assessment). The Internet provider of the institution (or university) needs to improve and maintain the quality of Internet connection by providing wide coverage of Internet access, high speed Internet access and capacity to download and upload multiple files. The main issue raised by the students in the e-learning activities was related to Internet or Wi-Fi problems. If Internet or Wi-Fi problems cause frequent interruptions for online collaboration, it can hinder students’ ability to connect and collaborate. This can also devalue e-learning approach as a valuable learning approach.

5.2 Collaborative learning tasks

The affordances of the e-learning tools must be specifically designed to support or host the collaborative learning tasks. The collaborative learning tasks needed to be carefully designed to include an authentic and relevant problem or real-world application and must be able to foster online collaboration (such as intra and inter group collaboration), not just a replication of a problem from an existing source (e.g. textbook). The e-learning tasks can also be conducted outside the university and include other actors from a wider setting (e.g. school or industry) to make the online collaboration more interesting and motivating. As commented by
some students, this can include off-campus online collaboration that involves various students outside ICT education.

5.3 Collaborative learning approach

The pedagogical approach embedded in the e-learning tasks must be able to encourage students to embrace online collaboration (e.g. intra and inter students group collaboration). This can be achieved through training the instructor in facilitating the online collaboration learning process. The instructor plays an important role in engaging students in the e-learning activities, and as such introduces them to the e-learning process, particularly during reflection. It is important for instructors to be prepared to guide and facilitate students into the learning process. They need to realize that e-learning involves learning that focuses less on the acquisition of examination-oriented information and contents and more on social activities for developing student knowledge. It is suggested that setting up the e-learning as an online space for learning can benefit other courses for online teaching and learning. The e-learning can add value to learning face to face where the design of online teaching and learning can be customized (or personalized). Students within the e-learning space can engage in working with other students by establishing their own interactions in accord with the orientation of the e-learning knowledge community. It is proposed that the e-learning approach as an online space for teaching and learning can be put into practice across the curriculum at the tertiary level. The sharing of knowledge and reaching understandings resulting from students’ online collaborative interactions is an important part of the learning process, through supporting the students’ cognitive, social and emotional development.

6. Conclusion

This study has shown that e-learning can be effective in delivering positive outcomes for learning. The tools used in e-learning environment have particular affordances and constraints and these must be considered in the design of e-learning activities. These affordances can be seen through the use of technology (technical aspects), through the design of the learning tasks (social aspects), and through the pedagogical approach (pedagogy aspects) taken in delivering the e-learning. The study also showed that e-learning can be effective in facilitating online collaboration. However, the e-learning activities goals must be designed to foster online collaborations (e.g. intra and inter-group interactions) and to frame learners’ online collaboration for learning. The study revealed positive outcomes for learning were related to learner’s participation transformation in e-learning in developing
understandings and gaining expertise; in developing responsibility for their own and others’ learning; and in developing positive attitudes, confidence and satisfaction in the course. Students can also develop knowledge and skills and enhance their intra and interpersonal communication skills through delivering ideas, judgments and opinions within the online collaborative discourse. These skills are likely to contribute to their learning which is an important aspect in today's challenging world.

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