CHAPTER V

DISCUSSIONS

The data were discussed and presented into 3 parts according to the research objectives as follows:

Part 1. Developing online instructional course according to the social constructivist learning theory.

Part 2. Social constructivist environment

2.1 Comparing the social constructivist learning environment of the online instructional course between 2 strategies; collaborative and scaffolding method.

2.2 Assessing the social constructivist learning environment of the online instructional courses

Part 3 Performances.

3.1 Learning Achievement

3.1.1 Immediate learning achievement

3.1.2 Retained learning achievement

3.2 Participation process

3.2.1 Times and frequency

3.2.2 Participation process according by learning phase

3.2.3 How was the difference SCG students supported their teammates with their prior knowledge

3.3 Student perception and satisfaction

3.3.1 Student's perception of learning outcomes

3.3.2 Student's satisfaction with learning activities

Limitations and strengths of this study are also provided.

Part 1. Developing online instructional course according to the social constructivist learning theory.

This course was created by the principle of social constructivist learning theory, which social interactions between the experienced experts and the novices, the novices progressively creates a deeper understanding of the profession.

Activities of the course were developed from The SCLD Grid and the pilot study (The introductory module of pharmacy professional practice in pharmaceutical marketing and business). Course activities consisted of both individual tasks and interaction tasks. It was designed to serve individual- cognitive development; cognitive development by social interaction, the zone of proximal development achieved to students via two strategies of scaffolding; CLG (peer- peer, equal knowledge) SCG (peer- more capable peer, different knowledge) Students agreed that learning by sharing experience together could expanded their ideas.

This course designed to construct individual knowledge as shown in individual activities Phase I, II including some parts of Phase III. Interaction activities were mainly to construct higher cognitive development in Phase III and IV. The diverse perspectives, experiences, and backgrounds of all students were important for everyone to learn from everyone else. Students depended on each other's contribution in their learning.

Online Community Pharmacy course consisted of 4 phases (Table 4.4). It was delivered over 15 weeks (one semester). It was designed consistent with the Social Constructivist Learning Development Grid (SCLD Grid).

A model describes knowledge gained during phase III as shown in Figure 5.1 knowledge acquisition in this phase was an iterative process involving exposure to some information (a seed from facilitator), linking it to other known things and working with others by various activities. This process repeated as many cycles as students required to build expected knowledge. Seed in this study was composed of both content and activities, which guided students to achieve learning outcomes.

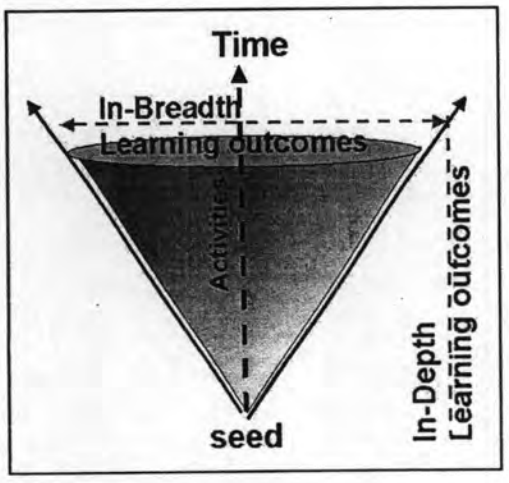

Figure 5.1 Model to describe the knowledge acquisition

The breadth and depth of the model represented to the breadth and depth of knowledge. As seen in Figure 5.1 that the breadth and depth of learning outcomes depended on students themselves, how frequently they approached to the content and the activities.

For "collaborative group" CLG groups, the students had to study one unit of content in each round. All students in each subgroup studied together. CLG students got the similar information of contents. From round I to round III, they studied the content of unit 2 to unit 4 respectively. Each CLG student was expected to have in-breadth learning outcomes since he/she studied all units of content of community pharmacy management.

The second strategy was "scaffolding group" (SCG) which one subgroup studied only one unit of content that differed from others during Phase III (From round I to round III) There were 3 subgroups studied unit II,III and IV separately. The time duration to learn one unit of content for scaffolding group was as long as time

duration for finishing 3 units of collaborative group. SCG students in each subgroup obtained the different information of content. Those who studied in the same subgroup were assumed to be experts in the prior content they had passed (more capable peer). They were expected to have in depth learning outcomes in that prior unit of content they approached.

The results from student performance part revealed that there was no significantly difference between CLG and SCG (Table 4.24 - 4.31).

Why the learning outcomes of those strategies were similar, both in-depth and in breadth? The in-depth learning outcomes could not be formed in SCG. The details of the activities in round I, II, III could not guide SCG students to construct in-depth outcomes. The seed facilitator provided to SCG was similar to CLG. The students had no seeding for in depth knowledge. Students could not initiate the depth ideas by themselves. They needed some guidance for that. In the PBL discussion of Phase III, SCG there were not many issues that were out of the assigned frame. It was not the same as facilitator expected.

Why SCG who approached only one unit of content can achieve the in breadth outcomes as CLG? The overall results show that SCG did not acquire less in-breadth learning outcomes than CLG. The process of scaffolding by peers in the late of phase III-IV, SCG who was an expert (more capable peer) in only one unit of content would contribute his knowledge to others and also he/she could receive the information from other experts. Peer- more capable peer interaction was occurred. Zone of proximal development was achieved. This process constructed the in-breadth learning outcomes.

Strengths of implementing this online course

As shown in Table 4.41 that online learning outcomes was recognized, especially in the aspect of learning process. Students perceived that prior knowledge was important to be important for escalating knowledge. Quality of knowledge that could be applicable in real life and systematic thought were also mentioned. (Table 4.43 and evidences from open-end questionnaire)

Weakness of implementing this online course

The average students perceived score of online learning atmosphere and motivation were the least. The course atmosphere encouraged interactions but it was not enough as students expected. (The coherent results were shown in Table 4.12, 4.21 and 4.43). The details of weakness perception were divided into learner perspective and instructor perspective.

Learner perspective

Inconvenient online learning was perceived according to many reasons. The first mentioned was the web course was too complicated. (Table 4.47) The web pages were inconvenient to explore, especially for assignment commands. They could not be easily recognized. For students mentioned the web course as untidy links because these web pages were designed for the experimental study. The inconvenient came with the study design itself, since Moodle cannot support confidential features for group-regroup separations. The regular learning web course would be simpler.

Students complained that there were too many online tasks /activities and those consumed more time than the traditional course. They were mentioned of the lack of systems reliability and access to the online course as well as inadequate infrastructure, or hardware.

It was also found in many studies that students would need more study time to complete the problem because of technological problems that they could not attribute directly to the electronic medium (Dennis, 2003;Holland, 2000) If student could not access the material due to technical problems, they became anxious and upset. If the student could not participate when she or he was ready but the technological working such as CMS features for web browsing or other technology did not work properly, he or she had lost a valuable learning opportunity. Students needed immediate and accurate responses to problems. The instructor had to be sensitive with those problems and find the solutions in a timely manner. The result was quite different concerns from the study of Zane Berge that only 3.9% of students stated a concern for access to the necessary technology for students. Berge's respondents were already teaching online for a while students got used to using online learning. In contrast, this online community pharmacy course was the first

course that was delivered completely online; students were unfamiliar with this strategy of learning then they concerned more with their inconvenient access.

Instructor perspective

The lack of an effective institutional network or technical assistance was a significant concerned. The same as many studies, facilitator/instructor suggested that to have technical assistance resources in place and maintained was a key to get success in implementing online course. (Berge, Muilenburg, & Haneghan, 2002; Cho & Berge, 2002; Levy, 2003)

Part 2. Social constructivist learning environment (SCLE)

2.1 Comparing the social constructivist learning environment (SCLE) of the online instructional course between 2 strategies; collaborative and scaffolding method.

There has been no study to evaluate the social constructivist learning environment (SCLE) existed between those strategies before. The existence of social constructivist environment in every aspect between CLG and SCG was not significantly different when ANOVA repeated measure was applied. (Strategy or group was the main effect. Aspect of COLLES and actual-preferred form of COLLES were the within subjects variables). Ceiling effect might be taken to account. Ceiling effect was that the two methods could not be compared well because both are achieving near the best practicable. There were 2 aspects of social constructivist environment that student mean score in CLG is higher than SCG; professional relevance and interactivity. For other aspects, SCG had lower score (From Table 4.21-4.23).

2.2 Assessing the social constructivist learning environment (SCLE) of the online instructional courses

Those 6 aspects of actual social constructivist learning environments (SCLE) score were more than 3 in both CLG and SCG group. (score 3 represented to sometime being existed)

The first two aspects of SCLE were professional relevance and reflective thought. Those perceived the relevance and reflective thought score was approximately 4 (From Table 4.5, 4.7 and 4.9). That was relatively high compared with other studies. (Dougiamas & Taylor, 2002) This online community pharmacy course was designed to let students explore the real site; they could apply what they have learnt to the pharmacy store. It is directly related to the pharmacy profession. Not only the authentic experiences, the course was designed to practice reflective thought in Phase II and lately of Phase III.

When compared the preferred and actual score of SCLE (Table 4.22), the results showed that the reflective thinking aspect of SCE that students in both groups had the actual score significantly more than preferred score significantly (For CLG and SCG; P =3x10-4, 0.006). The Reflective thought activity provided opportunities for students to explore specific issues in greater depth, link theory to practice, and to read and think more critically. Many students mentioned that this online course provided an opportunity for them to recognize and value their friends' thought which they have not ever done before (results from evidence supported student perception and satisfaction).

The relatively low score compared between aspects of SCLE were in aspects of interactivity and peer support. (From Table 4.5, 4.12 and 4.16) The results were similar to the study of Dougiamas & Taylor (2002). He found that the actual social constructivist environment score of postgraduate course called "Constructivism" at Curtin University of Technology, was relatively low in Interactivity and Peer support aspect (score was around 3) The result from his analysis revealed that "Time Pressure" was strongly complaints. In this study, the reasons for relatively low score of social constructivist environment in the aspect of Interactivity and Peer support could be explained related to inconvenient online learning based on the results of the overall online community pharmacy course evaluation (From Table 4.47)

One reasons of relatively low score of interactivity and peer support mentioned in the study of Dougiamas M. (2002) was that students have felt it was safer to empathize with others and then explain their own thoughts in a non-confrontational way. There was a feeling of politeness and perhaps shyness among the small group, this would keep personal distance, which inhibited interactivity or peer support. In this online community pharmacy course it was presented that there was a feeling of politeness, but there was no evidence to verify that this inhibited interactivity or peer support. After investigation, the cause for that different effect was students who enrolled in Dougiamas course were diverse both in terms of their ages, backgrounds and perspectives, as well as their physical locations (North Queensland, New Zealand, South Australia, Western Australia) but in this study, students were from the same class, they were not strangers at all.

If the students got used to the online tasks and friends the interaction and support would be increased. The result of interaction diagram of this study was shown that the first round (initial period of Phase III) students in CLG had lowest level of interconnected messages (From Figure 4.3 (a)). They had posted just to finish their task assignment. When the time passed they seemed to have higher level of inter-connected messages. They had more interaction.

Tutor/facilitator support, one aspect of SCLE was one important factor to make online course success (Swan, 2001). The result from overall evaluation questionnaires (open-ended part) revealed that students were satisfied with the speedy response when they posted in the "Ask Facilitator Forum"(From evidence corroborated overview course evaluation). This study, facilitator did her work online only. She constructed the online web course, providing parallel learning encouragement and monitoring online interaction at the same time. This provided student's expectation on a speedy response. When the facilitator response as soon as students expected then they satisfied. Consequently, facilitators can make student satisfied by letting them know a schedule of their online durations. Students can expect when the facilitator will be online to give response to their request and their expectation would be simply fulfilled. In this study, facilitator spent a lot of time online. As Cavanaugh shown that the amount of time spent teaching an online course increased directly with the number of students enrolled. This condition should be concerned when the future course was performed (Cavanaugh J.).

The last aspect of SCLE was interpretation. Students perceived that Interpretation score more than 4 (From Table 4.19 mean CLG and SCG = 4.10, 4.16). "Four" is the number represented to the frequency "often" to be existed. It could be implied that students made good sense of the messages posted and this online (asynchronous) communication was comprehensible and meaningful.

Compared all aspects of SCLE to Johnson K. et al, They studied 16 students studying a programming language module. Johnson applied blended method in his course. The value of perceived interpretation and relevance were 3.6 and 4.1 whilst the perceived reflective thought score was 3.2. Johnson's course had students' perceived score in all aspects of SCLE less than this online community pharmacy course. (Kevin Johnson, Cathal McHugo, & Hall, 2006).

Part 3 Performances.

3.1 Learning Achievement

3.1.1 Immediate learning achievement

3.1.2 Retained learning achievement

The number of student who participated in the first and second examination was 45 and 36 respectively (100% and 80%). The time of second test is nearly the time for the students to finish their student life; they concentrated in finding their job. Moreover, the results from the second test had no effect to students. Therefore, the second exam response rate was not a hundred percent. To confirm that the students who participated in the second exam were similar to the entire group, Independent T test of the first time exam score was calculated. The result showed that the first time score of the group of students who participated at the second time examination was not different from that of the entire group. (65.65+ 6.46 vs 65.27+6.14, respectively P=0.787).

The overall of retained learning achievement after 5 months the online community pharmacy course had been finished was around 87% (Table 4.28). Due to lack of other published data, the comparison of this result with other studied in the field of pharmacy education was rather difficult. But it can be predicted that the retained learning achievement was decreased over time. The results were in the

same manner as the study of Naidr, Adla, Janda, & et.al., (2004). The retained knowledge after online medical informatics course after 12 months was close to 67%.

The learning achievement of the two strategies CLG and SCG was not different as discussed earlier. As the last four categories were considered to represent higher skills, the result was shown that SCG got the score of lower skills more than that of higher skills when the time passed. On the contrary, CLG got more score of higher skills than that of lower skills (Figure 4.8). There was a need for more investigation about level of Bloom's competency achieved from CLG and SCG strategy.

3.2 Participation process

3.2.1 Times and frequency

Moodle program automatically recorded the time when students logged on to the web. It generated the outputs in the form of graphs and charts but not the exactly amount of time. Moodle program cannot calculate the total time as well as the time spent in each activity specifically. It recorded the time each student logged on each activity but there was no record for logging out. This calculation process was a burden and time consuming. There would be an error on the side of underestimating the time rather than overestimating it. It would be much more useful if CMS can provide the straightforward way to calculate the time spent on the course. Since it can give information what part of course students were stuck or interested.

. This study calculated the time consumed directly from the time logged on and the results seemed that the average time spent per week was around 1.5 hours (From Table 4.32). The time calculated was the only time surfed on the web but the course had some activities outside the web, such as authentic experiences (visiting drugstore), finding some related information as a foundation of their reflective thought, and concept mapping also needed some time to crystallize. Students mentioned that they spent more than 4 hours studying offline. Consequently, total time spent for studying this online course cannot be calculated by the time on the web directly. A direct time measurement was not perfect in evaluation an online learning process, since there was no way to tell from the history file alone how long they were browsing a particular web site. They could switch back and forth between work and web (i.e. reading a few paragraphs while something was compiling or

running). Moreover, it could not guarantee that web sites browsed or hit were read, since students used the web for real work, and "for fun" web browsing activity. Students cannot be paying any attention to a page they are viewing.

There was another way to assess the time spent. In the study of Alexander J W .et al. (2003) in online nursing course, they measured time spent on the course by surveying student's perception about how much time the student spent each week on the course and how that amount of time compared with the amount of time they had spent on other courses. The results presented that most students reported spending at least 5 hr per week and 63% felt they spent about the same amount of time as in other courses (Alexander, Polyakova-Norwood, Johnston, Christensen, & Loquist, 2003).

3.2.2 Participation process according by learning phase

All students participated in the preparation phase (From Table 4.33). There were many reasons to support that well participated outcome. This course was a novel online instruction, students were curious to know how to study, and being online student was faddish at the beginning. Furthermore, as the semester started the computer lab was not so crowded; it was convenient enough for students to participate.

The inconvenient online learning was perceived according to many reasons. (From Table 4.47) (As mentioned before) It was found during implementation phase (phase III-IV) for example, the web course was more complicate over time.

How was the difference SCG students supported their teammates with their prior knowledge

During Phase IV each individual in SCG was expected to provide expertise in their previous unit of content to help co-construct their team's solution for PBL. The result was not confirmed that (From Table 4.38 - 4.40). The quantity of the unit content referred by each student was not significant different. This meant whatever content unit SCG students concentrated in phase III, students could post the PBL assignment in Phase IV not only in their prior knowledge got from phase III but also in other content units. As discussed early, that the activities of the course could not lead SCG students to study in-depth, but they gained in-breadth learning outcomes.

Moreover, to post PBL answer in Phase IV, it depended on both the student skills and the problem itself. In this study the problem was assigned students to find the problem and the solutions of the messy drugstore in the picture. It was easy to omit to some problems since the picture could not give those details.

More study was desired to evaluate whether students in SCG subgroups could perform their role as experts or more capable peers in that limited time. Further investigation was also needed to examine how to perform expert and peers interaction.

3.3 Student perception and satisfaction

3.3.1 Student perception of learning outcomes

Average perceived score of Cooperative learning skill was lowest, whilst average perceived score of friends' prior knowledge and experience sharing online were important for escalating student's own knowledge was highest (From Table 4.43). This result corresponded to the result in COLLES that students perceive score in interactivity aspect was quite low and the least score of satisfaction was from online interaction activities. (From Figure 4.15) However, students agreed that their knowledge gained depended on friends sharing prior knowledge and experiences (From Table 4.43).

3.3.2 Student satisfaction with learning activities

The agreement score was the relatively lowest in the item of appropriate for convenient online learning as mentioned before and the highest was in the item of appropriate for font and image, regardless of groups. (From Table 4.46).

Focus on the inconvenient exploring the web course; the course was created by Moodle 1.4.5. Since Moodle version1.4.5 did not provided features for confidential group and subgroup discussion then there were some untidy links from page to page. Consequence, many students suggested that it should have been features to help for web navigation. According to Lou McGill et.al (2005) who found that well-structured learning resources facilitated team collaboration and the online learning. The negative feedback from this web course should be corrected. (Lou McGill et al., 2005)

Limitations

This is the first complete online course in pharmacy faculty, and then students did not get used to study like this before. Students also met face to face in other traditional classes. Although the facilitator asked all participants to communicate online but the offline interaction can be easily occurred.

The strengths

This experimental study includes the instructional design, development and evaluation process as a whole. The study was set-up centered on a large number of dependent variables. Quantitative and qualitative data were applied together. The collected data and analyzed results provide many indications to make the further research worthwhile.