

## INSTRUCTIONAL DESIGN AND ASSESSMENT

### Social Constructivist Learning Environment in an Online Professional Practice Course

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**Objective.** To assess the online social constructivist learning environment (SCLE) and student perceptions of the outcomes of the online introductory module of pharmacy professional practice that was designed based on social constructivism theory.

**Design.** The online introductory module of pharmacy professional practice in pharmaceutical marketing and business was carefully designed by organizing various activities, which were intended to encourage social interaction among students. The Constructivist Online Learning Environment Survey (COLLES) was applied to assess the SCLE. Course evaluation questionnaires were administered to assess student perceptions of this online module.

**Assessment.** The result from the COLLES illustrated the development of SCLE in the course. The students reported positive perceptions of the course.

**Conclusion.** An online introductory module of pharmacy professional practice in pharmaceutical marketing and business was effective in promoting SCLE.

**Keywords:** social constructivist, online learning, Constructivist Online Learning Environment Survey (COLLES), pharmacy education

## INTRODUCTION

Social constructivist learning environment (SCLE) is the environment represented in the context of social constructivism theory, which describes a way of knowing in which students or learners construct their new understanding and knowledge during the process of social interaction with others.<sup>1-3</sup> Vygotsky, the main architect of social constructivism, stated that by interaction and help from more knowledgeable peers, one could develop more profound comprehension than his/her individual capacity. The discrepancy between the abilities displayed independently and with social support is defined as the Zone of Proximal Development (ZPD).<sup>4-5</sup> Significant guidance from more knowledgeable peers or experts is believed to elevate student abilities within the ZPD and is known as *scaffolding*. According to social constructivism, learning occurs when students share background information and participate in the give and take of collaborative and cooperative activities. While they are negotiating the

meaning, they are constructing their own knowledge.<sup>1,6-7</sup> The social constructivism theory places the emphasis on students rather than instructors. Students learn best when they actively construct their own understanding through social interaction with their peers. They are encouraged to discover their own solutions and to try out ideas and hypotheses. The responsibility of the instructor is to facilitate the students' learning process around a particular content. Instructors should design and structure learning activities so that students can exercise their capabilities in knowledge formation.<sup>8-9</sup>

The principle of social constructivism promotes students' deep understanding and creativity.<sup>1</sup> These abilities are expected and should be planned for health professional students including pharmacy graduates. An online setting allows instructors to consistently embed SCLE into the learning process. Online communication can stimulate the slow thinkers and those reluctant to engage in face-to-face discussion to participate. The asynchronous mode of online communication provides participants with more time to think and an equal right to share their thoughts. Meaningful and active online discussion among students will result in an effective knowledge sharing and cognitive development. Online technology

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can also provide access to rich sources of information and promote fruitful interaction with contents. These features are feasible for initiating SCLE.<sup>10-12</sup>

In pharmacy education, the online learning course designed based on social constructivism is quite novel. Thus, the learning outcomes needed to be investigated. The hypothesis of this study was that an online learning course designed on social constructivism theory would promote SCLE. Within this environment, students would perceive that knowledge was gained and be satisfied with the course.

## DESIGN

During the first 2 years of the pharmacy education program at Chulalongkorn University, Thailand, students were taught basic scientific principles. They began their professional studies in the third year with the introductory module, *Pharmacy Professional Practice*. This course was planned for the summer semester before students started their fifth semester of the curriculum. The objective of the course was to expose and orient students to various fields within the pharmacy profession. This study was conducted using the introductory module of pharmacy professional practice in pharmaceutical marketing and business as an exemplar. This module carried several objectives. It was intended to provide students with an understanding of the pharmacist's role in the business field, including marketing, clinical research, academic detailing, and drug development. It was also to provide an understanding about how to motivate, lead, and work with others to accomplish organizational and personal objectives. It was for students to learn and recognize the responsibilities of managers, administrators, and pharmacy personnel in pharmaceutical companies. Moreover, this program was intended to familiarize students with marketing plans and policies in the pharmaceutical company.

The introductory module, *Pharmacy Professional Practice* was an 8-week course with weekly assignments and activities. The course began in May 2004, during summer semester, and ended in late June, 1 month after the first semester of the third academic year had started. The course format was a combination of face-to-face and online learning sessions. The orientation, a drug company visit, and the final class were conducted in a face-to-face classroom setting. Other activities took place online. The open source software program, Moodle, version 1.3.2, which stands for Modular Object-Oriented Dynamic Learning Environment, was used as an online course management tool.<sup>13</sup>

Various activities were arranged to achieve cognitive development including "authentic experience," "think aloud," "reflective thought," and "group working."

The activities were assigned in sequence to scaffold students to do more complicated tasks and to promote SCLE. "Authentic experience" was designed to allow students to collect information from a real practice setting. Arrangements were made for students to visit drug companies and observe the roles and career paths of pharmacists. They were also provided an opportunity to talk with pharmacists during their visit. Following the activity, each student wrote a summary of his/her experience and posted it online.

"Think aloud" was a weekly online activity to promote online interaction and systematic thinking. Students were instructed to post their thoughts on the Web and correspond with others every week. The content of the postings was related to the content of the course. Students were asked to categorize their thoughts before posting. The details of those categories were as follows:

- "I learned" indicated that the student gained new knowledge/information;
- "I wondered" indicated that the student was in doubt and wanted to find out something;
- "I was surprised" indicated that the student was surprised about the new knowledge he/she gained;
- "Aha!" indicated that the student acquired unexpected knowledge;
- "I will study" indicated that the topic was interesting and he/she would like to research or study it more;
- "I knew" indicated that the student knew the answer for their friends' questions and wanted to share or exchange information with his/her friends.

Reflective thought was an online activity designed for students to think reflectively and systemically by writing a page-length essay about pharmaceutical marketing and business and exchanging their thoughts online with classmates. The exchange process required students to comment on at least one of their friends' thoughts as well as respond to those comments in his/her own essay. Students were assigned to do this reflective thought activity every 2 weeks.

Group working required students to work collaboratively in a small group. Two equivalent groups of 15 students were formed. Students were matched by cumulative grade point average (GPA), age, and gender, as well as learning style, and then randomly allocated to one of the groups. This was to ensure that both groups had a similar learning environment. Each group was given an assignment to compare marketing strategies used by the drug companies for a pair of prescription or nonprescription drugs. One group worked on 2 prescription drugs

while the other worked on 2 nonprescription drugs. Fifteen students in each group were further divided into subgroups of 3 students to ensure that all members had equal opportunity to participate. Each subgroup was responsible for different parts of contents covering marketing strategies, eg, product, price, place, and promotion. Two private areas on the Web were created to facilitate communication within each group as well as serve as the coordinating point among subgroups. The students presented their group assignments in the classroom during the concluding class period.

Facilitating an online class was different from facilitating a face-to-face one. The physical absence of the instructors caused the need for other ways to create the motivational link between instructors and students.<sup>14-15</sup> In this study, instructors acted as online facilitators and were responsible for creating a friendly and interactive online atmosphere. The management part of the facilitator's role also involved setting the learning agenda and providing detailed instructions, learning activities, timetable, resources, and materials for learning. They also supported facilities or technology as necessary.

Various online discussion forums were created. For each activity, including Think Aloud, Reflective Thought, and Group Working, a separate discussion forum was developed by the facilitators to encourage online interaction. The Announcement Forum was the one-way communication forum for conveying updated information or assignments from facilitators to students. The Ask the Facilitator Forum was the 2-way communication forum between facilitators and students. The purpose of this forum was for students to ask questions and discuss teaching and learning issues related to the course. An unstructured discussion forum, called the Free-Talk Forum, was set up so that students and facilitators could communicate informally at anytime during the course. This encouraged a friendlier online environment among participants and instructors.

Prior to enrollment, students were informed about the course format and the study being conducted. At orientation, instructors/facilitators met face-to-face with students. Information on general characteristics, learning style, and the expected online learning environment (measured by the preferred forms of the COLLES) of each student were collected. How to study in this course and details of online activities were provided. Logins and passwords for Web site access were assigned to students. Students were required to practice using Moodle and get acquainted with all of its features. After orientation, the course started with relatively simple activities, but these became more and more difficult as students became more familiar with the technology and novel style of learning.

The activities were arranged in the following sequence: authentic experience, think aloud, reflective thought, and group working. Throughout the course, students learned by integrating what they already knew with new information obtained through interaction with others. At the end of the course, students presented their group assignments in the classroom. Finally, they were asked to evaluate the course.

Three instruments were applied in this study to assess learning style, SCLE, and student perceptions of the course. First, the translated version of a questionnaire created by Grasha and Reichman was used to assess student-learning style.<sup>16</sup> The learning style referred to the individual's preferred approach for learning, based on his or her unique background and ability.<sup>17</sup> The learning style was one of the controlled variables used to match students when they were allocated into groups. The learning style of members in the group could have an influence on the learning environment. Previous research showed that the different learning styles of the online students had an effect on their learning achievement.<sup>18</sup>

Grasha and Riechmann proposed 6 learning styles. *Competitive* students were self-motivated to do better than other students and wanted to be the first at learning. *Collaborative* students preferred working with others as they learned and viewed the classroom as a social environment. *Avoidant* students were not interested in learning and would prefer to be elsewhere. *Participant* students enjoyed classes and took responsibility in what was required. *Dependent* students viewed the teacher as an authority and learned only what was needed. *Independent* students preferred to think individually and were confident in their ability to learn.<sup>19</sup>

The Constructivist Online Learning Environment Survey (COLLES) was used to assess SCLE. The COLLES was an online questionnaire, which was developed from the theory of social constructivism. There were 2 forms of the COLLES, the preferred and actual form.<sup>20</sup> The COLLES contained parallel items designed to measure how often students expressed preferences and the actual extent of the online learning environment. Thus, the person-environment match could be estimated as student satisfaction, which was measured by comparing actual and preferred scores. It could reveal whether the students' expectations were fulfilled. This survey consisted of 24 questions arranged into 6 aspects, including relevance, reflection, interactivity, tutor support, peer support, and interpretation. Relevance questions assessed how this online learning was relevant to students' professional practices. Reflection questions asked if this online learning stimulated students' critical reflective thinking. Interactivity questions measured the extent of students' online

educative dialogue. Tutor Support questions evaluated how well tutors enabled students to participate in this online learning. Peer Support questions assessed if fellow students provided sensitive and encouraging support. Interpretation questions asked if students and tutors made good sense of each other during their communication.

Those 6 aspects were concerned with student preference and perception of the existence of an online SCLE. The question items utilized a 5-point Likert response scale on which 1 = never, 2 = seldom, 3 = sometimes, 4 = often/frequently, and 5 = almost always. Both forms of the COLLES were translated into Thai and pretested with students who did not enroll in the course.

Students completed the preferred form of the COLLES at orientation and the actual form at the end of the course. (Appendix 1)

A course evaluation questionnaire was developed using a 5-point Likert scale to assess students' perceptions on knowledge gain and satisfaction. The higher the score, the higher level of knowledge and satisfaction students perceived during the course.

Students completed the course evaluation at the end of the semester. Data were obtained from the COLLES and the course evaluation questionnaires. Descriptive analysis was performed. The paired *t* test was applied to evaluate whether students were satisfied with the course by comparing actual and preferred scores. If the preferred and actual scores were not different, then students' expectation were fulfilled and it could be concluded that students were satisfied with the course.

## ASSESSMENT

Thirty third-year pharmacy students enrolled in this online introductory module of Pharmacy Professional Practice in Pharmaceutical Marketing and Business. The average age of the students was  $19.7 \pm 0.6$  years. There were 8 males and 22 females, which was quite similar to the proportion of the third-year class as a whole. The primary learning style reported by the majority of students (21) in this course was "collaborative." The general characteristics and learning style of the students who enrolled in this course is shown in Table 1.

All 30 students completed the preferred form of the COLLES at the beginning of the course. Students expected the environment of the course to be SCLE ( $3.9 \pm 0.3$ ). Students had the highest expectation on the aspect of professional relevance ( $4.2 \pm 0.5$ ) and the lowest on the aspect of interactivity ( $3.6 \pm 0.5$ )

Twenty students (67%) completed the actual form of the COLLES at the end of the semester. The result showed that students perceived the environment of the course as

Table 1. Characteristics and Learning Style of Students Enrolled in an Online Version of a Pharmacy Professional Practice Course (N = 30)

Characteristics	Group 1	Group 2
Gender (n)		
Male	4	4
Female	11	11
Learning Style, No. (%)		
Collaborative	10 (67)	11 (73)
Dependent	3 (20)	3 (20)
Participant	2 (13)	1 (7)
Grade Point Average <sup>a</sup>		
Mean (SD)	3.09 (0.33)	2.99 (0.28)

<sup>a</sup>Grade point average based on a scale of 0 to 4

SCLE with a mean score of  $3.8 \pm 0.3$ . Actual SCLE scores on all aspects were rated in the same way as student's preference scores that students rated the highest on the aspect of professional relevance and the lowest on the aspect of interactivity ( $4.1 \pm 0.5$  and  $3.6 \pm 0.5$ , respectively). The preferred and actual SCLE scores were compared using the paired *t* test and no significant difference was found (Table 2). The result indicated that students' expectations were fulfilled or students were satisfied with the course.

At the end of the course, 28 students (93%) provided feedback about the course. Twenty-seven reported that the course activities held their attention and added to their knowledge. All students agreed that the knowledge gained was understandable and applicable.

The overall mean score of student perceptions of this course was  $3.6 \pm 0.7$  with the highest score on "group working" ( $3.7 \pm 0.6$ ) (Table 3). Results revealed that online "group working" was perceived as the most preferable activity ( $3.6 \pm 0.6$ ). "Reflective thought" and "group working" were perceived as the most beneficial activities ( $3.8 \pm 0.6$ ). Students agreed that all activities should be included in the future course with the highest score in "group working" ( $3.9 \pm 0.7$ ).

Twenty-three students (77%) agreed that self-directed learning skills were required, while 20 (67%) concurred that collaborative skills were also needed. Only 2 students (7%) were dissatisfied with the time period when the course was conducted.

Mean student perception scores on the outcome aspects were high (Table 4). The result from the course evaluation questionnaires reported that students agreed very much that they gained their knowledge after this online course ( $4.3 \pm 0.6$ ). Overall satisfaction with the course was also perceived as positive ( $3.7 \pm 0.6$ ). Twenty-one students (70%) preferred the online course

Table 2. Comparison of SCLE Scores Between the Preferred and the Actual COLLES Across All Aspects (N = 20)

Aspects of SCLE	Preferred COLLES Score		Actual COLLES Score	
	Mean (SD)		Mean (SD)	P
Relevance	4.2 (0.5)		4.1 (0.5)	0.338
Reflection	3.9 (0.5)		3.7 (0.4)	0.160
Interactivity	3.7 (0.5)		3.6 (0.5)	0.494
Tutor Support	4.0 (0.6)		4.1 (0.4)	0.456
Peer Support	3.7 (0.4)		3.6 (0.5)	0.399
Interpretation	4.2 (0.5)		4.0 (0.4)	0.123
Total SCLE	4.0 (0.4) <sup>a</sup>		3.8 (0.3)	0.185

Abbreviations: COLLES = Constructivist Online Learning Environment Survey

<sup>a</sup>The mean and standard deviation of the preferred SCLE scores of all students who enrolled in this course was 3.9+ 0.3 (N = 30)

The 5-point Likert scale used was 1 = almost never, 2 = seldom, 3 = sometimes, 4 = often/frequently and 5 = almost always

to a traditional format, whereas 7 students (23%) liked the formats equally well.

## DISCUSSION

The online course of the introductory module of Pharmacy Professional Practice in Pharmaceutical Marketing and Business was developed by applying various activities in order to create an effective online learning environment based on social constructivism theory. It is believed that sharing various perspectives and experiences with other people who have similar or different perspectives and life experiences is the process of learning.<sup>21-26</sup> Facilitators needed to know more than course content; design issues were also crucial. The difficulty of this online module was in creating the most appropriate learning environments for students to interact and construct their own knowledge. Facilitators should influence the way of learning to develop and empower students to take ownership of their own learning.

The course was designed to include authentic tasks through drug company visits, and many meaningful interactions such as “think aloud” and “reflective thought” activities. The “group working” also allowed students to share and negotiate their ideas with others while solving online assignments. Activities provided students with an opportunity for enhancing the learning content and responsibilities.

Students had to discuss pharmaceutical marketing and business in every assignment of this module. It was the important role of facilitators to find ways to encourage

and engage students in the learning process.<sup>15</sup> Those new to online learning often find text-based discussions difficult to follow. As a result, facilitators needed to motivate students to engage in in-depth online discussions, particularly at the beginning of the course. The more the facilitators appeared online, interacting with students and participating in discussions, the more students were encouraged to participate. However, too much participation by facilitators could have adversely affected interaction among students. They would have turned to interact with instructors instead of classmates. Thus, facilitators’ participation was more intensive initially and then phased out as the course progressed. At the final part of this course, students had to manage their “group working” by themselves with very little involvement or guidance from the facilitators. This was the concept of scaffolding, which enabled students to do more advanced activities and to engage in more advanced problem solving.<sup>27,28</sup>

This module was the first course that was delivered mostly online and using a novel style of learning based on social interaction. Most of the students had never experienced this style of learning. Pincas believed that it was important for the number of online students to be small to increase online learning benefits, otherwise the amount of messages could be overloaded and become too difficult to follow.<sup>29-30</sup>

In this study, online facilitators were expected to respond to all students’ queries and be responsible for the

Table 3. Student Perception Scores on Class Activities From Course Evaluation Questionnaires (N = 28)

Perceptions Class Activities	Student Liked the Activity, Mean (SD)	Activity was Beneficial, Mean (SD)	Activity was Appropriate for Future Course, Mean (SD)	Students’ Overall Perception, Mean (SD)
Authentic Experience	3.4 (0.6)	3.7 (0.7)	3.8 (0.7)	3.6 (0.7)
Think Aloud	3.2 (0.6)	3.5 (0.6)	3.6 (0.7)	3.5 (0.7)
Reflective Thought	3.5 (0.6)	3.8 (0.6)	3.7 (0.7)	3.7 (0.6)
Group Working	3.6 (0.6)	3.8 (0.6)	3.9 (0.7)	3.7 (0.6)

The 5-point Likert scale was used (1 = least, 2 = less, 3 = much, 4 = more and 5 = most)

Table 4. Student Perception Scores on the Aspects of Course Requirements and Outcomes From Course Evaluation Questionnaires (N = 28)

Items	Mean (SD)
Self-directed learning skills were required.	4.2 (0.7)
The collaborative skill was required.	3.9 (0.8)
The time period was suitable.	3.6 (0.9)
Overall course activities were appropriate.	3.9 (0.5)
Students liked this kind of learning method (compared with the traditional one).	3.9 (0.6)
Student was satisfied with all activities in this module.	3.7 (0.6)
Students perceived their knowledge gain after finishing this module.	4.3 (0.6)

The 5-point Likert scale used was 1 = least, 2 = less, 3 = much, 4 = more, and 5 = most

provision of technical supports in the use of computer technology, Moodle, and online course materials. Therefore, enrollment was limited to 30 students.

After the course was implemented, it was hypothesized that this course promoted SCLE. Students perceived that knowledge was gained and they were satisfied with the course. To verify the hypotheses, SCLE was assessed online using the actual form of the COLLES and student perceptions of overall outcomes of the course were evaluated using course evaluation questionnaires. All assessments were voluntary.

Since an online learning environment was being assessed, the COLLES was administered online rather than during class. Only 20 students (67%) completed the actual form of the COLLES. This might be due to the inconvenience in accessing the computer during the time the traditional semester was operated and students were busy with their traditional class schedule. In contrast, the course evaluation questionnaire was distributed during the concluding class period, which 28 students (93%) attended. Two students asked to be excused from the evaluation session for personal reasons. The result revealed that the SCLE of this course was promoted. The mean actual score of the COLLES was  $3.8 \pm 0.3$ .

The introductory module of pharmacy professional practice was the first course in the professional practice course series. By implementing a new online learning tool, students tended to prefer the environment of the course as SCLE as seen by the mean preferred score of  $3.8 \pm 0.3$ . The result was consistent with Taylor's findings that students had rated the preferred form of COLLES as high expectations for SCLE in a Web-based course.<sup>31</sup>

The comparison between the preferred and the actual COLLES scores revealed that students seemed to be satisfied since their expectation seemed to be fulfilled. The actual scores were not significantly different from their expectations. This was consistent with the results of the course evaluation, ie, that students were satisfied with all activities conducted in this online course.

Under the SCLE, students constructed their own knowledge using social interaction. Students found it was not easy to move from a passive learning to an active learning style. They still expected to learn from instructors as indicated by their responses in the course evaluation questionnaires. This result was confirmed by the relatively low actual scores of COLLES on 2 aspects: interactivity and peer support ( $3.6 \pm 0.5$  and  $3.6 \pm 0.5$ , respectively). The results were similar to those of Dougiamas's study, where the actual COLLES scores of a postgraduate course called Constructivism at Curtin University of Technology were also relatively low on interactivity and peer support.<sup>13</sup>

The analysis of evaluation questionnaires revealed that students agreed that their knowledge was gained and they were satisfied with the course. The knowledge in this study was measured indirectly through student perceptions. Direct measurement of actual knowledge gained, such as by test or examination, should be conducted in the future.

After the regular semester started, students spent most of their time at the college. They found it more convenient to discuss course assignments face-to-face rather than online. It was a limitation of this study.

## SUMMARY

The online introductory module of Pharmacy Professional Practice in Pharmaceutical Marketing and Business was carefully designed, developed, and implemented based on social constructivism theory. Various activities were included for students to generate, exchange, and negotiate their experiences, and construct knowledge in pharmaceutical marketing and business. The course promoted a social constructivist learning environment in which students perceived that knowledge was gained and indicated that they were satisfied with the course.

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Appendix 1. Preferred and Actual Form of the Constructivist Online Learning Environment Survey (COLLES)

Each one of the 24 statements asks about students' preferred experience in this online course and student actual experience in this online course. Scale: almost never = 1, seldom = 2; sometimes = 3; often/frequently = 4; almost always = 5.

	<b>Preferred Experience</b>	<b>Actual Experience</b>
Relevance	In this online unit, I prefer that. . .	In this online unit. . . 1 my learning focuses on issues that interest me. 2 what I learn is important for my professional practice. 3 I learn how to improve my professional practice. 4 what I learn connects well with my professional practice.
Reflection	In this online unit, I prefer that. . .	In this online unit. . . 5 I think critically about how I learn. 6 I think critically about my own ideas. 7 I think critically about other students' ideas. 8 I think critically about ideas in the readings.
Interaction	In this online unit, I prefer that. . .	In this online unit. . . 9 I explain my ideas to other students. 10 I ask other students to explain their ideas. 11 other students ask me to explain my ideas. 12 other students respond to my ideas.
Tutor Support	In this online unit, I prefer that. . .	In this online unit. . . 13 the tutor stimulates my thinking. 14 the tutor encourages me to participate. 15 the tutor models good discourse. 16 the tutor models critical self-reflection.
Peer Support	In this online unit, I prefer that. . .	In this online unit. . . 17 other students encourage my participation. 18 other students praise my contribution. 19 other students value my contribution. 20 other students empathise with my struggle to learn.
Interpretation	In this online unit, I prefer that. . .	In this online unit. . . 21 I make good sense of other students' messages. 22 other students make good sense of my messages. 23 I make good sense of the tutor's messages. 24 the tutor makes good sense of my messages.