

CHAPTER IV

RESULTS

This chapter reported the results collected from this study. Not only the results but data analysis were also included. The data were analyzed and presented into 4 parts according to the conceptual framework as follows:

Part 1. General characteristics

1.1 General characteristic of the sample

1.2 General characteristic of the course

Part 2. Designed course

Part 3. Social constructivist learning environment of the course.

3.1 Social constructivist learning environment of 2 strategies; Collaborative and Scaffolding (CLG and SCG). All aspects were analyzed separately with some qualitative data supported of genuine surroundings to ensure the social constructivist environment of this online classroom.

3.2 Compared the existence of social constructivist environment between 2 strategies; Collaborative and Scaffolding (CLG and SCG)

Part 4 Performance.

4.1 Learning Achievement

4.1.1 Immediate learning achievement

4.1.2 Retained learning achievement

4.2 Participation process

4.2.1 Times and frequency (number of visits)

4.2.2 Participation process according by learning phase

4.3 Student's perception and satisfaction

4.3.1 Student's perception of learning outcomes

4.3.2 Student's satisfaction with learning activities

Part 1. General characteristics

1.1 General characteristic of the sample

As mentioned, forty-five of the fifth year pharmacy students voluntarily enrolled to the online community pharmacy course, 17 were men (37.78%) and 28 were women (62.22%). All Students were in the same age group, from 21 to 23 years old (64.44% were 22 years old). Students were from various tracks, since this online community pharmacy is an elective course. Majority of students enrolled in this course was from Pharmacy administration track, the next below was Clinical pharmacy track and the others were from Manufactory, Micrology and Pharmacognosy track. The average GPAX was 2.92 ± 0.35 . Approximately 90% had experience in the drugstore before. About 30% perceived they were convenient enough to use Internet to study. The average perceived score of computer skill was 6.77 ± 1.75 , whereas the average MPI score was 31.64 ± 8.16 . The criteria for separating introvert and extrovert type of personality was the MPI percentile score at 25 and 75 respectively. If the total MPI score was less than 25, type of personality was grouped as introvert. On the contrary, if the score was equal or more than 40, it was grouped as extrovert. In this study, there were 13 students who were categorized to introvert, and 12 were extrovert. Since there were many studied revealed that students with different personalities expressed different preference for online courses, the MPI score was carefully considered when students were separated into groups. Six and 7 students were introvert in CLG and SCG correspondingly, whereas 5 and 7 were extrovert in CLG and SCG respectively.

There was no statistical significant different between characteristics of CLG and SCG as shown in Table 4.1

1.2 General characteristic of the course

Community Pharmacy course is an elective course for the fifth year pharmacy students. It provides 1 lecture credit (1 hour/week) and 1 laboratory credit (3 hours/week). It is to promote an understanding of the management in community pharmacy. Prerequisite for this course is Pharmacy administration course.

Table 4.1 General Characteristics of students in this study

		CLG	SCG	Total	P
Gender	Female	14	14	28	P=0.848
	%	63.64	60.87	62.22	(Chi-square;
	Male	8	9	17	df =1)
	%	36.36	39.13	37.78	
Age	21 yrs	1	2	3	P=0.809
	%	4.55	8.70	6.67	(Chi-square;
	22 yrs	14	15	29	df =2)
	%	63.64	65.22	64.44	
	23 yrs	7	6	13	
	%	31.82	26.09	28.89	
Track	Pharm.Ad	13	13	26	P=0.915
	%	59.09	56.52	57.78	(Chi-square;
	Clinic.	7	7	14	df =2)
	%	31.82	30.43	31.11	
	Others.	2	3	5	
	%	9.09	13.04	11.11	
Average grade	GPAX	2.94 \pm 0.36	2.91 \pm 0.36	2.92 \pm 0.35	P=0.798
	(Min-Max)	(2.32-3.60)	2.41-3.72)	(2.32-3.72)	(T test;df=43)
Experience in drugstore	No	2	2	4	P=0.271
	%	9.09	8.70	8.89	(T test;df=40)
	Yes	20	21	41	
	%	90.91	91.30	91.11	
mean hours experience 164 \pm 178.50 219 \pm 137.49 193.19 \pm 158.77					
Perceived convenience in internet surfing					
	mean	6.55 \pm 3.14	6.81 \pm 3.66	6.68 \pm 3.38	P=0.797
	Convenience(person)	17	17	34	(T test;df=43)
	%	77.27	73.91	75.55	
Perceived skill in computer					
	mean	7.01 \pm 2.08	6.54 \pm 1.36	6.77 \pm 1.75	P=0.374 ^a
	(Min-Max)	(3-10)	(4-9)	(3-10)	(T test;df=36)
Personality	MPI	31.68 \pm 6.96	31.61 \pm 9.32	31.64 \pm 8.16	P=0.976
	(Min-Max)	(19-42)	(13-46)	(13-46)	(T test;df=43)
Total		22	23	45	
	%	100	100	100	

^a Equal variances not assumed

Part 2. Designed course

Online community pharmacy course 2005 was developed from the pilot course "The introductory module of pharmacy professional practice in pharmaceutical marketing and business 2004". The Goal, objectives, content and activities of the course are planned as a coherent whole.

2.1. Goal of the course by social constructivist learning theory

The course was for students to construct their own concepts of community pharmacy management by online social constructivist environment.

The online course was to facilitate student to develop their own cognitive skills by social interaction with their peers. The course provided students with opportunities to gather and interpret community pharmacy management data and relevant information together. Active individual and active environment was to achieve knowledge co- construction.

2.2 Course objective

The course exposed students to the community pharmacy management. At the end of the course series, students should be able to explain the proper management of the drugstore in various aspects as general retail management, physical management, marketing management, inventory management, information management, regulatory management, personnel management and quality management

2.3 Course content

The content of the course followed the textbooks accepted by National Association of Retail Druggists (NARD), American Association of Colleges of Pharmacy (AACP), National Association of Chain Drug Store (NACDS). The total content was gathered then categorized into 4 units for this online course as shown in Table 4.2

Table 4.2 Summary unit of content and its details

Unit	Topics	Details
Unit 1.	1. General Retail Management	<ul style="list-style-type: none"> · Retail market structure · Retail market strategies
Unit 2	2.1. Physical Management 2.2. Marketing Management	<ul style="list-style-type: none"> · Location analysis · Space management · Merchandising management · Promotion and Advertisement
Unit 3	3.1. Inventory management 3.2. Information management	<ul style="list-style-type: none"> · Purchasing · Inventory control and management · Pricing · Information system · Information technology use in community pharmacy
Unit 4	4.1. Regulation Management 4.2. Quality Management 4.3. Human Resource Management	<ul style="list-style-type: none"> · Ethics and community pharmacy law & regulations · Services and pharmaceutical care

2.4 Course activities based on social constructivist learning theory

Some online activities had been applied before in the introductory module of pharmacy professional practice in pharmaceutical marketing and business 2004, and they could generate social constructivist learning environment. Some activities were added to make it suitable for acquiring more individual cognitive development such as concept mapping and quiz (pre-post reading test).

Table 4.3 Theories, designed activities and expected outcomes

From theory	Designed activities	Expected outcomes
Social constructivism		
Individual- cognitive development; (individual)	Individual activities Authentic experience by visiting community pharmacy Reading related material and document Quiz, concept mapping to organize the information received	Individual knowledge construction; learning achievement.
Cognitive development by social interaction (social), ZPD, scaffolding by peers	Interaction activities Think aloud Reflective thought Collaborative problem solving	Social knowledge construction; learning achievement. Social constructivist environment, Online communication skill, Systematic thinking skill, Cooperative learning skill
Task Scaffolding by facilitator	Increase student's responsible-ness on uncomplicated to more complicated tasks.	Self direct learning skill
Facilitator's support	Facilitate the students' learning process.	Student motivation, Student Retention

2.5 Final course structured based on social constructivist learning theory

Subsequent to examining content, created activities, and roles of instructor, subsequently online course was formatted. The results was presented in Table 4.4

Table 4.4 Designed course (From theory to weekly structured).

Week	Theory	Instructional goal	Lesson content	Instructional procedure	Evaluation
Phase I					
1	Individual cognitive development	To understand overall learning goal, student's new role and instructor's expectation.	Course Orientation and Overview:	The tasks and concepts were explained, introduced and shown in class.	Student participated in the classroom
Phase II					
2	Individual cognitive development	To be able to access to online course	Moodle – software orientation	Practicing computer skills in the computer laboratory.	Student could log in to the online course
3-5		To be able to develop concept map	How to develop concept Map	Facilitator presentation	Student created their own concept map after reading content every round(4 rounds)
3-5	Individual cognitive development	To get used to Moodle software and features, To be able to apply all Moodle features related to the course	Moodle features	Practicing all feature	Student could applied Moodle features
		To practice the online communication skills	Computer mediated communication skills	Practicing posting student's expectation	Student posted at least one expectation at the "What's your expectation?" forums
		To explore scope of community pharmacy management	Introduction to community pharmacy management	Authentic experience, first observing the real world of the community pharmacy	Student visited at least one drugstore and conducted an interview with at least one community pharmacy

Table 4.4 Designed course (From theory to weekly structured). (continue)

Week	Theory	Instructional goal	Lesson content	Instructional procedure	Evaluation
3-5	Individual cognitive development	To practice the online communication skills and systematic thought	Introduction to community pharmacy management	Categorizing thought and then posting at think aloud forum	Student posted at least one at "Think aloud" forum
		To practice the online communication skills and reflective thought		Posting reflective thought	Student posted at least one initiation.
	Cognitive development by social interaction	To share experiences with peers		Practicing, sharing experience and systematic thought	Student posted at least one at "Think aloud" forum
		To practice the online communication skills and share experiences with peers		Posting peer feedback at friend's reflective thought	Student posted at least one feedback and responded to friend's comment at least once at his own initiative reflective thought
6-7	Individual cognitive development	To acquire knowledge of community pharmacy management	Unit I	Examine the objective of each unit of content	
				Reading related documents	
	Pre post testing	Student did all quizzes			
	Concept mapping	student added more concepts to his/her own concept map			
Cognitive development by social interaction	To acquire knowledge of community pharmacy management	Small subgroup PBL	Student shared his/her knowledge at least one posting in PBL		

Table 4.4 Designed course (From theory to weekly structured). (continue)

Week	Theory	Instructional goal	Lesson content	Instructional procedure	Evaluation
There will be two different online strategies designed in the context of social constructivism to compare the outcomes.					
Phase III					
8-11	Individual cognitive development	To acquire knowledge of community pharmacy management	Unit II, III, IV (as assigned)	Examine the objective of each unit of content	
	Cognitive development by social interaction			Reading document	
				Pre post testing	Student did all quizzes
				Concept mapping	Student added more concepts to his/her own concept map
				Small subgroup PBL	Student shared his/her knowledge at least one posting per round in PBL
Note:		Round 1;CLG subgroup 1-3	Unit II		
		Round2; CLG subgroup 1-3	Unit III		
		Round3; CLG subgroup 1-3	Unit IV		
		Round1-3 SCG subgroup 1	Unit II		
		Round1-3 SCG subgroup 2	Unit III		
		Round1-3 SCG subgroup 3	Unit IV		



Table 4.4 Designed course (From theory to weekly structured). (continue)

Week	Theory	Instructional goal	Lesson content	Instructional procedure	Evaluation
Phase IV					
12-15	Cognitive development by social interaction	To integrate knowledge together with peers	Applied knowledge	1. Posting reflective thought	Student posted at least one initiation, from the issue he was interested in the previous phase
				2. Posting peer feedback at friend's reflective thought	Student posted at least one feedback and responded to friend's comment at least once at his own initiative reflective thought
		To applied knowledge together with peers to solve the real world problem	Applied knowledge	New subgroup PBL	Student shared his/her knowledge at least one posting per round in PBL
	Scaffolding by peers For SCG, peers from different unit of content. For CLG, peers from equal contents.	To integrate knowledge together with peers	Applied knowledge	Both Reflective thought and peer feedback	
		To applied knowledge together with peers to solve the real world problem	Applied knowledge	New subgroup PBL	Student shared his/her knowledge at least one posting per round in PBL
	Individual cognitive development	To summarize students information and concept	Unit I-IV	Complete concept mapping	Student completed his/her own concept map

Part 3 Social constructivist environment of the course.

The online community pharmacy course was developed according to the pilot course with minor changes related to the course content. The results of social constructivist learning environment of online community pharmacy course were shown as follows.

3.1 Social constructivist learning environment of 2 strategies; Collaborative and Scaffolding (CLG and SCG)

Actual form of The Constructivist On-Line Learning Environment Survey (COLLES) was applied to assess social constructivist learning environment (SCLE) existed during the online course. The results were presented as follows.

Total perceived social constructivist learning environment

As the score of the 24 statements of The Constructivist On-Line Learning Environment Survey (COLLES) -actual form were summated, the student perception score of the online environment were revealed into 6 aspects as shown in Table 4.5

Table 4.5 Mean PSCE score in each aspect of COLLES of online community pharmacy course

	Actual from Community Pharmacy Course	
	Mean	SD
Relevance	3.95	0.61
Reflection	3.98	0.67
Interaction	3.36	0.86
Tutor Support	3.83	0.83
Peer Support	3.25	0.82
Interpretation	4.13	0.50
Total perceived social constructivist learning environment	3.75	0.52

Table 4.6 Students and mean PSCE compared between groups

	Total	CLG	SCG
Students who had mean PSCE score less than or equal to 3 (3 → sometimes)	3	2	1
(Percentage)	6.67	9.09	4.35
Students who had mean PSCE score more than 3 (3 → sometimes)	42	20	22
(Percentage)	93.33	90.91	95.65
N	45	22	23

The highest score was perceived in the aspect of interpretation. The lowest score was perceived in the aspect of peer support.

More than 90 % of the students in both groups perceived that the online community pharmacy course they involved had the mean score of the existence of social constructivist environment more than 3 (3 represented to sometimes).

From this point, the results of this study would be presented according to those six main items of COLLES to assess all aspect of the social constructivist environment students perceived during online community pharmacy course.

1. Professional relevance

Perceived professional relevance

The result was shown that the mean score of student's perceived professional relevance of the course is nearly often to exist (3.95 ± 0.61 with 4.02 ± 0.58 and 3.88 ± 0.64 of CLG and SCG respectively). The detail of each statement was presented in Table 4.7

Table 4.7 Mean PSCE score in the aspect of professional relevance compared between groups

	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
My learning focuses on issues that interest me.	3.69	0.73	3.91	0.68	3.48	0.73
What I learn is important for my professional practice.	4.22	0.79	4.32	0.78	4.13	0.81
I learn how to improve my professional practice.	3.76	0.77	3.73	0.83	3.78	0.74
What I learn connects well with my professional practice.	4.13	0.81	4.14	0.77	4.13	0.87
Relevance	3.95	0.61	4.02	0.58	3.88	0.64

Table 4.8 Students and mean PSCE score in the aspect of professional relevance compared between groups

	Total	CLG	SCG
Students perceived mean Professional Relevance score more than 3 (3 → sometimes)	42	21	21
(Percentage)	93.33	95.45	91.3
Students perceived mean Professional Relevance score less than or equal to 3 (3 → sometimes)	3	1	2
(Percentage)	6.67	4.55	8.7
N	45	22	23

More than 90 % of the students in both groups perceived that the online community pharmacy course they involved had the mean score of the actual of Professional Relevance more than 3 (3 represented to sometimes). There were only one from CLG and two from SCG that perceived the mean score in professional aspect equal or less than 3.

Evidence supported professional relevance

Linking community pharmacy-related topics based on assignment named "Reflective thought" and "Think Aloud", facilitators encourage students to focus and/or expand their topic as their interests. These online activities at their minimum could be described as a "guide" to structure students' available knowledge around learning objectives more than a traditional time-limited classroom could provide, and the students themselves could freely select the topics, which was related to the community pharmacy content without restraint so they could focus on their interesting topics. After observing all the topics during phase III-IV, it was shown that all the topics students posted connected well with community pharmacy practice. For example; Episode 1, the point of the topic selected by student number 37 was related directly to the course in the unit 2 about location analysis, merchandising management, promotion & advertisement and the other students seem interested by seeing many exchange existed in this topic. There were also a lot of postings students responded to their friends referred to students' prior experiences, which would be benefit for future development in the community pharmacy practice (Episode 2-4). Example of quotations presented the student ability to link the real world and the learning problem assignment were presented in Episode 5-6.

Episode 1 (Relevance)

The criteria people used for selecting drugstore

CLG, Phase III

By 37 - Monday, 29 August 2005, 10:11AM

"I found the information in a magazine regarding the behaviors of Thai consumers in getting health service at a pharmacy. Based on a marketing study conducted by a private organization in early 2005, among 300 sampled consumers who used to buy medicine(s) or come for health service at least once during the past 12 months, 80 % of them (240 persons) used to buy medicine(s) from a drugstore. The top five reasons they used as the criteria for selecting drugstore were listed as the followings based on the scores received for each one."

Episode 2 (Relevance)

Replied: Pricing war at the drug marketing business

CLG, Phase III

By 3 - Saturday, 3 September 2005, 08:44PM

"But... from my professional practice at the drugstore, my preceptor could dispense medicines a thousand baht each time. His customers believed in his pharmacy skills, whatever the medicines or the health supplement he recommended could be sold without negotiation. In my opinion, this is because the pharmacist spent a lot of friendly counseling time to their clients. During my experience there, I noticed that the pharmacist regularly updated his knowledge. When there was

any new information related to his patients, he didn't hesitate to let his patients know. This is his concern. If I were the patient, I would have bought medicines from this pharmacist also even though the price was higher."

Episode 3 (Relevance)

Sale Promotion strategy could increase the amount of goods sold, is that right for medicines?

SCG, Phase III

By 7 - Monday, 29 August 2005, 02:23PM.

"From my professional practice at franchise drugstore, the goods there included medicines dispensed by pharmacist and others. This drugstore located in the tourist community, from Hong Kong, China, Japan and Europe. Many customers always come and buy goods at the same time, but there was still some silent periods. The most income of this store came from the health un-related goods. During a opening time in the morning the store manager who was a pharmacist would receive the promotion plan from the center. Sometimes he would plan the promotion strategy by himself to increase the total amount of goods sold for getting the target point. For example, if the target point was 180000 baht the promotion strategies would be applied such as....."

Episode 4 (Relevance)

Well and stable sustainable by whom?

SCG, Phase III

By 36 - Saturday, 3 September 2005, 06:23PM

"After reading learning document our teacher provided and from my experience at the drugstore, I think that the customers can make drugstore stable and well sustainable. If a drugstore had no customer, It was sure that that drugstore could be ruined. Therefore the important factor for drugstore management to concern was customer's satisfaction. All drugstore should study and observe their clients' needs satisfaction and behaviors which would be applied for future decision making and management planning"

Episode 5 (Relevance)

Replied: Unbelievable!!!

CLG, Phase IV

By 19 - Wednesday, 31 August 2005, 07:57PM

"The important problem for Thai community pharmacy is not the management at all, but it is no pharmacist available in the drugstore."

Episode 6 (Relevance)

Replied: The first problem; space and merchandising management

SCG, Phase IV

By 42 - Monday, 12 September 2005, 04:47PM

"In the future I hope not to see your guys' drugstore like this..... So terrified!"

2. Reflective thinking

Perceived reflective thinking

The mean score of student's perceived reflective thinking during the course is nearly often to exist (3.98 ± 0.67 with 3.85 ± 0.58 and 4.11 ± 0.57 of CLG and SCG respectively). The detail of each statement were presented in the Table 4.9

Table 4.9 Mean PSCE score in the aspect of reflection compared between groups

	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
I think critically about how I learn.	3.93	0.78	3.77	0.81	4.09	0.73
I think critically about my own ideas.	4.00	0.85	3.91	0.97	4.09	0.73
I think critically about other students' ideas.	3.96	0.82	3.86	0.83	4.04	0.82
I think critically about ideas in the readings.	4.04	0.77	3.86	0.83	4.22	0.67
Reflection	3.98	0.67	3.85	0.76	4.11	0.57

Table 4.10 Students and mean PSCE score in the aspect of reflection compared between groups

	Total	CLG	SCG
Students perceived mean reflective score less than or equal to 3 (3 → sometimes)	4	2	2
(Percentage)	8.89	9.09	8.70
Students perceived mean reflective score more than 3 (3 → sometimes)	41	20	21
(Percentage)	91.11	90.91	91.30
	45	22	23

More than 90 % of the students in both groups perceived that the online community pharmacy course they involved had the mean score of the actual of Reflective Thinking score more than 3 (3 represented to sometimes).

Evidence supported reflective thinking

There were activities assigned to encourage students to think reflectively and systemically. There were 3 students of CLG (13.6%) and only 1 student of SCG (4.3%) who did not participate in the reflective thought activity at phase III-IV. Besides doing students' own reflective thought, each student had to select and commented at least one of their friends' thought and finally they should give a reflect to their friends' comments. 11 of the 22 and 12 of 23 participants of CLG and SCG respectively fulfilled this task.

Table 4.11 Number of posts in the reflective thought activities (Phase III)

Peer support		Mean posting per student \pm SD.	Mode	Range	P-Value (t-test)
Reflective initiate	Total	0.91 \pm 0.29	1	0-1	
	CLG	0.86 \pm 0.35	1	0-1	
	SCG	0.96 \pm 0.21	1	0-1	0.291 * df= 43
Response To reflective forums	Total	4.98 \pm 4.79	2	0-18	
	CLG	6.32 \pm 5.87	2	0-18	
	SCG	3.70 \pm 3.10	2	0-12	0.072 *df=43

* Equal variances not assumed

During Phase IV, students tried to achieve the team goal by solving the assignment problems, the quality of their on-line participation were displayed in the conference. Cognitive level of one's contribution was related to student understanding, reasoning, and the development of critical thinking and problem solving skills. There were 18 and 20 from CLG and SCG (81.81% vs. 86.96% respectively) who participated to exchange their information with others in this assignment (see Figure 4.3(c) from interactivity aspect).

To measure what level of cognitive processing exhibited in students' posts, content analysis was conducted by employing Henri's criteria. It was found that students of the two groups posted their comments with not only the surface of the problem (elementary clarification) but in-depth or higher cognitive skills also as shown in Figure 4.1

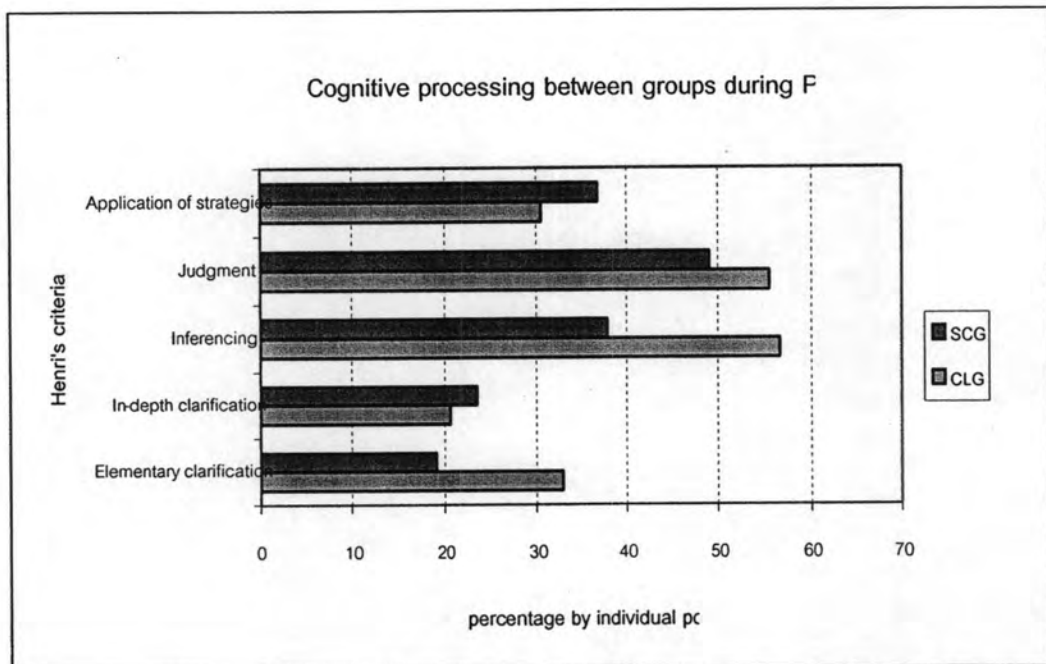


Figure 4.1 Cognitive processing by Henri's criteria between groups

The examples of students' posting to show reflective thought existed in this online community pharmacy course. One student posted her reflective thought about Pricing war and analyzed the solution with critical thought.

Episode 1 (Reflective thought)

Pricing war

CLG, Phase III

By 9 - Wednesday, 31 August 2005, 12:22AM

How can we do if there was a pricing war among drugstores.. All drugstores would try to compete with each other mainly by pricing strategy.....(explanation).....

.. From those two solutions, the first one is for the urgent solving but the other solution is for long term. The encouragement and co-operation among stakeholders included us, a little component, is necessary.

Episode 2 (Reflective thought)**Pricing strategy... if it is good, you can win.**

SCG, Phase III

By 40 - Thursday, 1 September 2005, 07:18PM

Reflective thought of pricing strategy. After my professional practice and my knowledge from the learning document of this course, I think how to set the price is important and depend on various factors.....(explanation).....

At the comprehensive phase, students had to solve the assigned problem with their team but some students did not focus only at the assignment, they expanded their critical thought to their friends.

Episode 3 (Reflective thought)**Worth thinking issue!**

CLG, Phase IV

By 24 - Monday, 29 August 2005, 07:09PM

I have one worth thinking issue. If one drugstore has a proficient full time pharmacist, while the other has a well-organized merchandising without pharmacist, which drugstore do we choose? In summary what is the criteria we should concern more between personnel and the well-organized merchandising. (Elementary clarification)

Episode 4 (Reflective thought)**Replied: Messy Drugstore**

SCG, Phase IV

By 44 - Monday, 12 September 2005, 11:11AM

Add to the problem seen, I think the source of this messy came from too much medicines stocked (Judgment) The area to stock the medicines is inappropriate due to 1. The cabinets were not categorize by medicine groups. The value of categorized cabinet is(explanation)..... (in-depth clarification)

3. Interactivity

Perceived interactivity

The mean score of student's perceived Interactivity during the course is nearly often to exist (3.36 ± 0.86 with 3.40 ± 0.91 and 3.33 ± 0.84 of CLG and SCG respectively). The detail of each statement were presented in the Table 4.12

Table4.12 Mean PSCE score in the aspect of interactivity compared between groups

	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
I explain my ideas to other students.	3.76	0.91	3.77	1.11	3.74	0.69
I ask other students to explain their ideas.	3.11	1.05	3.09	1.06	3.13	1.06
Other students ask me to explain my ideas.	2.87	1.10	2.91	1.06	2.83	1.15
Other students respond to my ideas.	3.71	0.99	3.82	1.01	3.61	0.99
Interaction	3.36	0.86	3.40	0.91	3.33	0.84

Table 4.13 Students and mean PSCE score in the aspect of interactivity compared between groups

	Total	CLG	SCG
Students perceived mean Interactivity score less than or equal to 3 (3 → sometimes)	14	6	8
(Percentage)	31.11	27.27	34.78
Students perceived mean Interactivity score more than 3 (3 → sometimes)	31	16	15
(Percentage)	68.89	72.73	65.22
	45	22	23

More than 65 % of the students in both groups perceived that the online community pharmacy course they involved, had the existence of Interactivity, which the mean score of the actual of interactivity was more than 3 (3 represented to sometimes).

Evidence supported interactivity

Students stimulated their teammates to exchange spontaneously. The online discussion atmosphere was friendly. The informal dialogues were always applied, such as nickname to identify whose comments were referred. This motivate student to feel comfortable with writing online discussion. The slang and sometimes-sarcastic language can communicate well and can show how the writer felt at that time. Instead of nonverbal communication that online could not provided. Some expressions could encourage teammate to collaborate. From this study it was found that students tried to attach their knowledge with others in a very polite way. Furthermore, they could freely explain their idea to others and they also can get the respond. Some comments related directly to the topics whereas some were to make a relationship or just for social communication. Friends' comments were always compromised. This made this online interaction atmosphere more comfortable. The examples were as follows.

Episode 1 (Interactivity)

Fascino

CLG, Phase III

By 39 - Thursday, 1 September 2005, 12:41PM

I read the article about Fasino. It was presented that....

Replied: Fascino

By 1 - Saturday, 3 September 2005, 11:21PM

This article would encourage some of our friends who want to be the owners of the successful drugstores.

Replied: Fascino

By 33 - Sunday, 4 September 2005, 01:32PM

Is there any other franchise drugstore in Thailand, besides Fasino?

Replied: Fascino

By 2 - Wednesday, 28 September 2005, 08:41PM

Fasino grows up very fast since I have just known it a couple years ago. Could we establish franchise drugstore that can compete with Fasino?

Episode 2 (Interactivity)

Replied: Pricing strategy... if it is good, you can win .

SCG, Phase III

By 7 - Monday, 5 September 2005, 03:40PM

I have one question, as mentioned, " some drugstores set a range of price for one medicine depending on the social status of the customers. If the rich, the price would be more expensive such as medicine A net price is 100 baht, might be sold in 110 baht for not exceeding profit. If the customer is poor then the price would

decrease, might be 90 baht. It would be unfair for consumers. However if the price is 150 baht for the rich we sold this medicine at 130 baht, on the other hand for the poor at 110 baht. It is the same method as the calculation process of income tax, the one who have more income should pay more tax.

Replied: Pricing strategy... if it is good, you can win

By 29 - Monday, 12 September 2005, 11:36AM

I think it is a good idea but what are the criteria used for separating the rich and the poor?

Episode 3 (Interactivity)

Replied: Summary of our team progression in doing the assignment.

CLG, Phase III

By 24 - Friday, 16 September 2005, 01:07PM

I agree with #19 (nickname) but there were some duplicate point. I think we should summarize into 3 main points. For example, Pharmacist point, Product point (the risk of dispensing expired medicines) and Place point (arrange the shelf, and display). Then we could pick details into those main three points.

Replied: Summary of our team progression in doing the assignment.

By 33 - Saturday, 17 September 2005, 07:07PM

Ummm.. I do agree with #24 (nickname) if the principle of management was applied as the reference, it would be great because in our course we studied mainly about the management such as item 1, 2 should be combined to Store design and display. Item 3, 5 should be combined to Inventory management.

In the comprehensive phase (phase IV), each subgroup had to find the solutions to the problem they got from the assignment in the schedule time. Each of students had a subgroup goal to achieve, and this brought him/her to practice him/her knowledge exchange with others. Hence, there were many interactions existed among students no matter groups they were.

Episode 4 (Interactivity)

Replied: Drugstore, really?

CLG, Phase IV

By 22 - Friday, 2 September 2005, 06:19PM

I haven't seen any drugstore in a mess like this before. I agree with #1 (nickname) about the expired medicines. To keep medicine like this is too difficult to monitor the expired date. My point is.....

Replied: Drugstore, really?

By1 - Saturday, 3 September 2005, 10:34PM

I do agree with #22's addition comment.

Episode 5 (Interactivity)**Inventory management problem**

SCG, Phase IV

By 7 - Wednesday, 31 August 2005, 11:58AM

This untidy drugstore design might have an affect on the inventory management system. We could not identify how much medicines left, how many to be ordered. Overstock or understock might occur.

Replied: Inventory management problem

By 17 - Monday, 5 September 2005, 09:04PM.

Sure, this messy drugstore could not applied the first in first out principle, then the risk to have overstock understock or expired medicines would be high.

Episode 6 (Interactivity)**The second issues; quality of the medicines**

SCG, Phase IV

By 6 - Friday, 2 September 2005, 06:08PM

I read #40 (nickname)'s posting, and bring this issue about the quality of medicines, which they didn't keep them neatly in the shelf. The expired date or the total amount of those medicines could not be recognized. How do you think? Come and share please.

Students tried to stimulate each other to join online interaction. The examples were below.

How do you think? If we were the owner of this drugstore what would have been done to solve the problem? From your postings, let's make a summary to see the causes of the problems, shall we?

Before anything, Hooooo!!! Is there any drugstore like this, so amazing?

Is there anyone who has any more idea? Please post. Oh! Addition issues is more than welcome, I have just only one. I would like my pals to help, join posting then our assignment will be done soon.

About other issues, if you know, please put in for me.

After analyzing the interaction round by round during the third phase, Figure 4.2 showed that when the time increased, the number of posts was also increased in both groups except the SCG subgroup-2 who had to studied only the unit 3 of the course.

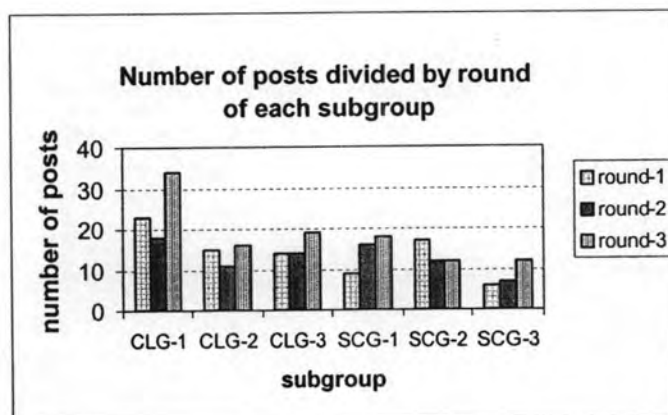


Figure 4.2 showed the number of forums posted in each subgroup during phase III

The online interaction diagram in Figure 4.3 (a)(b)(c) illustrated the patterns/ associations between online messages. In the diagram there were symbols applied. Those were number, square, line and arrow. The number stood for each student in the subgroup. The square represented the initiated forum posting; the arrow meant the interaction responded from one student to the other. The line with no arrow meant the posting was not directly responded to whom. The online interaction diagram in Figure 4.3 (a)(b) showed the interaction of the CLG and SCG subgroups during the third phase of the course.

During phase IV (comprehensive round) the interactions of all new subgroup were shown in Figure 4.3 (c). The different symbol above the number came from the previous subgroup during Phase III.

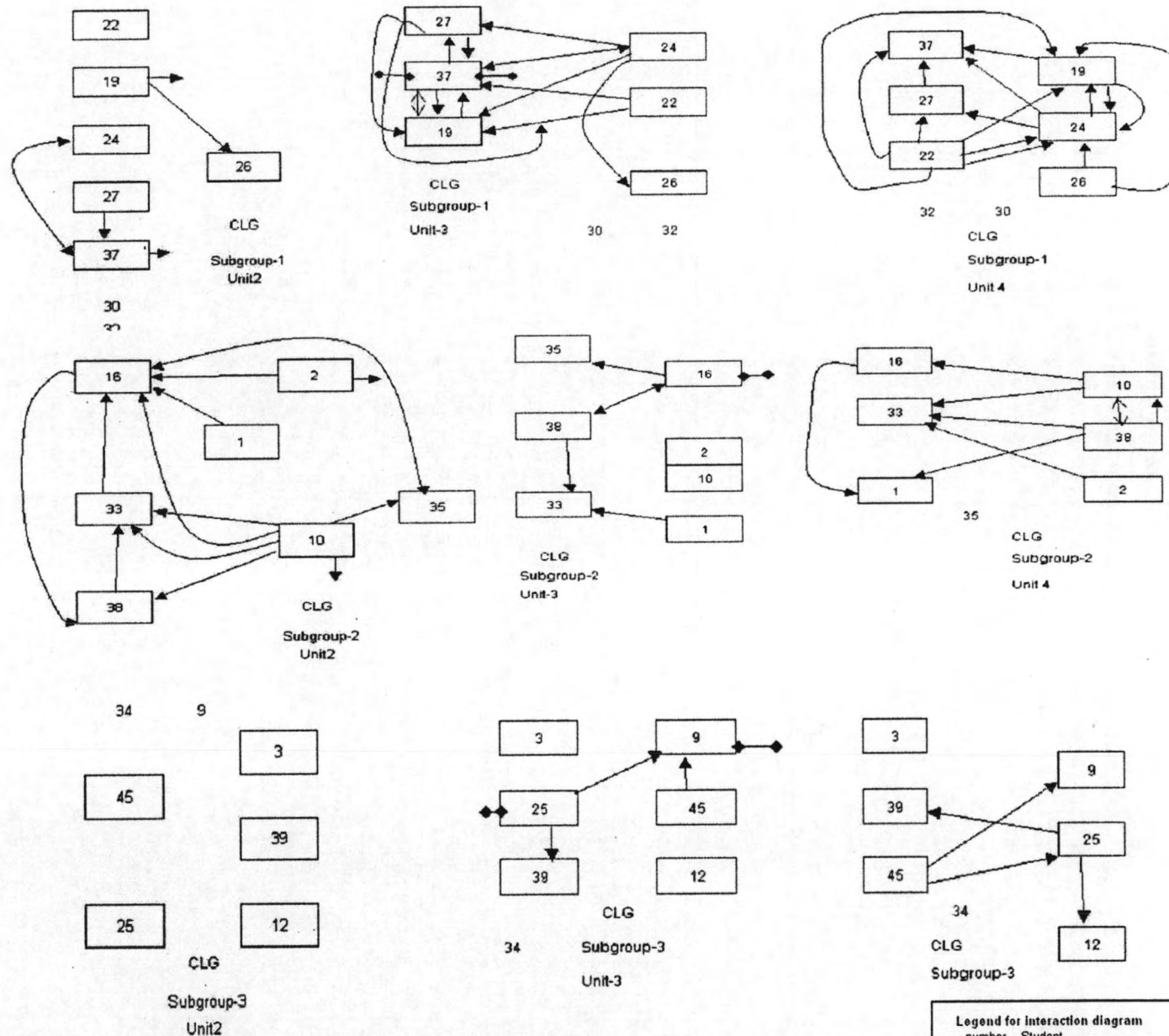


Figure 4.3 (a) Interaction diagram of CLG subgroups during Phase III

Legend for interaction diagram
 number Student
 [] Initiated forum post
 → Interaction from one to other
 - - - Interaction did not respond directly to whom

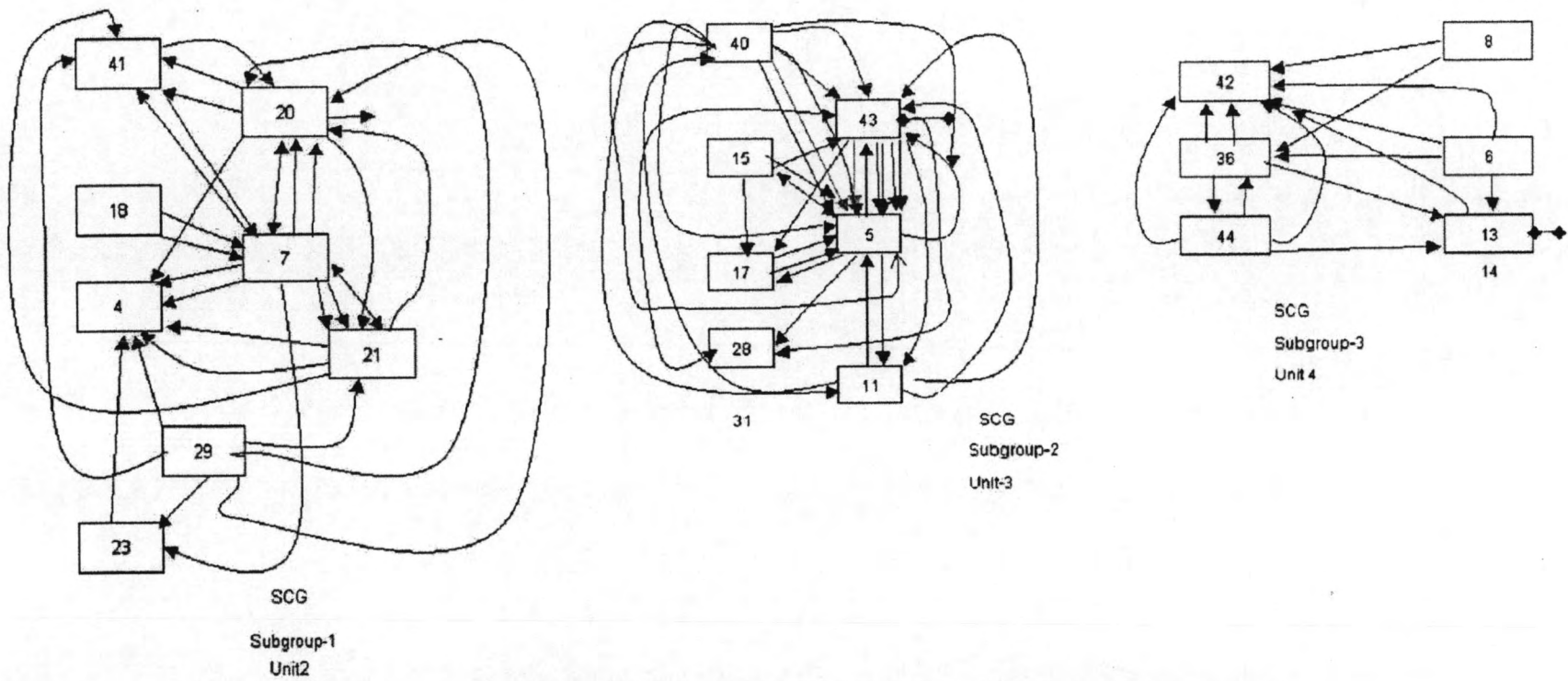


Figure 4.3 (b) Interaction diagram of SCG subgroups during Phase III

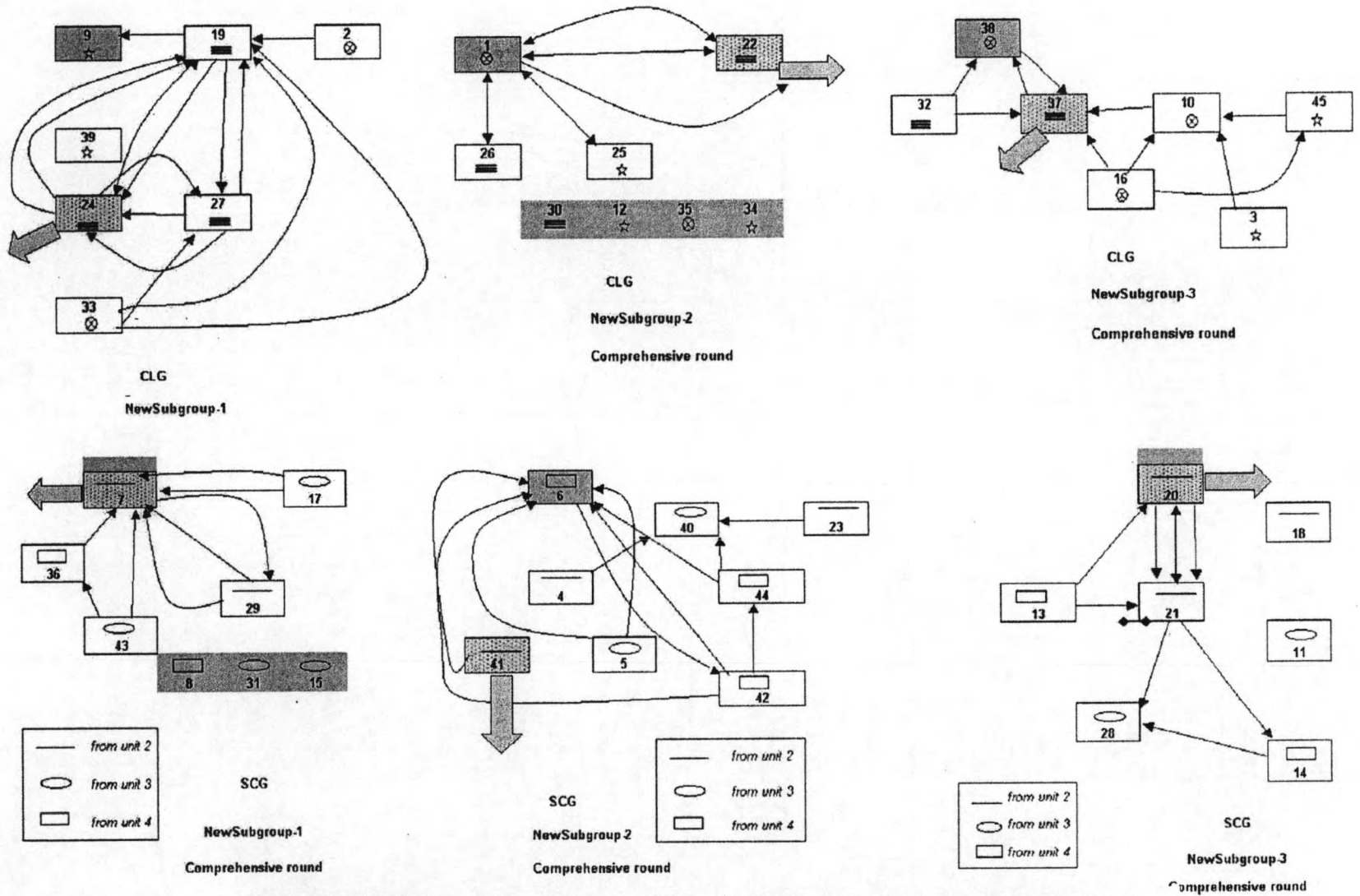


Figure 4.3 (c) Interaction diagram of CLG and SCG new subgroups during Phase IV

Starter	The same sign above or below number in the box (represented each student) presented that
Sender	students had been in the same subgroup in phase III of the online course
No interactivity	

4. Tutor Support

Perceived tutor support

The mean score of student's perceived tutor support during the course is nearly often to exist (3.83 ± 0.83 with 3.69 ± 0.78 and 3.96 ± 0.87 of CLG and SCG respectively). The detail of each statement were presented in Table 4.14

Table 4.14 Mean PSCE score in the aspect of tutor support compared between groups

	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
The tutor stimulates my thinking.	3.53	1.04	3.41	0.96	3.65	1.11
The tutor encourages me to participate.	4.13	0.87	3.95	0.95	4.30	0.76
The tutor models good discourse.	3.93	1.01	3.77	0.97	4.09	1.04
The tutor models critical self-reflection.	3.71	1.04	3.64	1.05	3.78	1.04
Tutor Support	3.83	0.83	3.69	0.78	3.96	0.87

Table 4.15 Students and mean PSCE score in the aspect of tutor support compared between groups

	Total	CLG	SCG
Students perceived mean Tutor Support score less than or equal to 3 (3 → sometimes)	9	4	5
(Percentage)	20	18.18	21.74
Students perceived mean Tutor Support score more than 3 (3 → sometimes)	36	18	18
(Percentage)	80	81.82	78.26
Total	45	22	23

More than 75 % of the students in both groups perceived that the online community pharmacy course they involved, had the existence of tutor support, which the mean score of the actual of tutor support was more than 3 (3 represented to sometimes).

Evidence supported tutor support

In this study, tutor acted as facilitator to stimulate students' thinking and encourage them to participate in the online course. Students were largely left to keep the discussion going on their own. On the web page, there was a forum for facilitator and students to meet called 'Ask -Facilitator forum' and the result showed that there were 77 items posted by students to ask facilitator. All students could access this online forum regardless of their groups. Students could post their questions everyday and every time they were convenient, similarly to facilitator could post the answers at anytime. Online discussions and the opportunity to ask, or answer, questions were on a 24 hour/day, seven-days/ week basis.

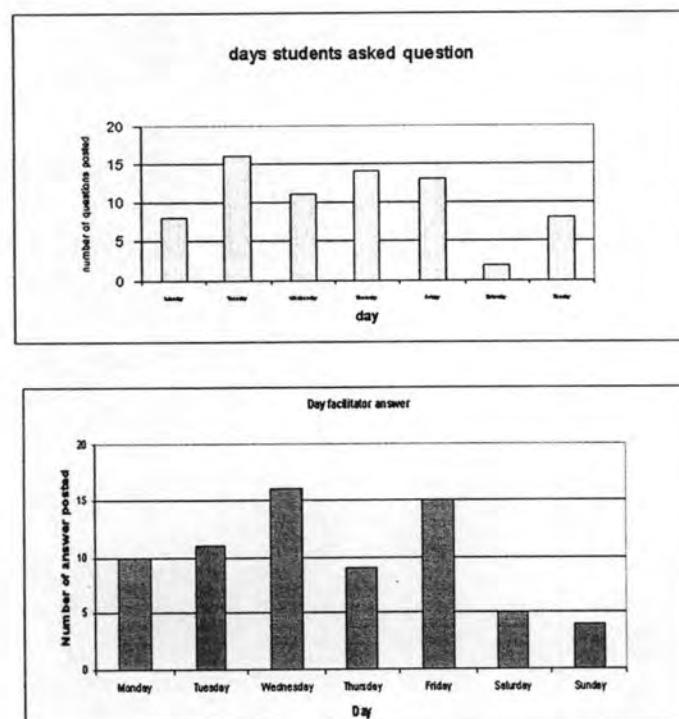


Figure 4.4 Number of "Asking Facilitator" forum posts by facilitator and students per day

The average number of questions posted per student in each group was not significantly different (1.41 ± 1.76 of CLG vs. 1.74 ± 2.16 of SCG) Focus on how fast facilitator responded to student questions, the average hours used was $4:43 \pm 3:54$ (0:02 -19:42). In the 'Ask -Facilitator forum' the tutor encourage students to participate. How friendly interaction among tutor/facilitator and students was presented as follows.

Episode 1 (Tutor support)**Sending an assignment.**

By 36 - Friday, 24 June 2005, 04:48PM

I am wondering about sending an assignment. If I want to do Think Aloud assignment, I have to write in the Think Aloud Forum, is that right? But why the assignment summary box shows that I didn't do the assignment. If I misunderstand something, please let me know.

Relpied: Sending an assignment.

By Tutor/Facilitator Friday, 24 June 2005, 04:56PM

36 (Name) You do it right!

The assignment summary box was set simply to link with the web calendar; don't pay any attention to it. Good that you asked.

Relpied: Sending an assignment.

By 36 - Friday, 24 June 2005, 04:58PM



Thank you so much.

Relpied: Sending an assignment

By Tutor/Facilitator Friday, 24 June 2005, 05:20PM

**Episode 2 (Tutor support)****Assignment**

By 16 - Tuesday, 28 June 2005, 09:22PM

Is it necessary to initiate the postings, if I replied my friends' posts, is that count for doing assignment?

Relpied: Assignment

By Tutor/Facilitator Wednesday, 29 June 2005, 08:02AM

If the assignment you meant was "think Aloud" ... Yes. But (name), don't forget to categorize your thought. Moreover, please do not focus on the assignment to be done. Try to read your friend's thought. If yours is not the same, give a discussion. The minimum as one post a week was set because I am worried there would be no replier, readers only. Don't forget, In this learning community, We are both contributors and receivers. See, very easy?

Episode 3 (Tutor support)**Ask teacher; I am confused about "Reflective Thought"**

By 40 - Thursday, 30 June 2005, 10:26PM

Teacher, the topic of reflective thought can be freely selected or only from the documents you posted. Looking forwards to your reply.

Relpied: Ask teacher, I am confused about "Reflective Thought"

By Tutor/Facilitator Friday, 1 July 2005, 06:52AM

Don't be confused, (name). You can pick any topic that related to your last visit at community pharmacy or any others which related to the documents I posted.

Please write your reflective thought followed by Dr.Anuchai's writing manual. Those should be included;

Select
Describe
Analyze
Appraise
Transform

-

The documents I posted could be applied as the fundamental ideas. If you have any other information that can be used in the reflective thought system, it would be ok.

Thank you for your question. The point might be clarified enough for your friends too.



Episode 4 (Tutor support)

Problems to discuss

By 5 - Wednesday, 3 August 2005, 12:55PM

For SCG subgroup-2 You assigned us to answer the problem at the end of the unit, one problem per round. But there were 7 problems that mean the other 4 problems would be left. Is that correct?

Replied: Problems to discuss

By Tutor/Facilitator Wednesday, 3 August 2005, 04:21PM

Do as you prefer. I don't have any limitation in each round. You can manage this among your own group. All of the problems should be done after 3 rounds.

The reasons or the origin of your thought and your exchange process is my concern .

For example, "This problem I have read from..... It was found that....."

"Yes. The pharmacist at my practice site thought the same, but may I add more?....."

Try to do in the same way as the above examples.

Episode 5 (Tutor support)

One more puzzling issue.

By 40 - Thursday, 4 August 2005, 07:04PM

I am confused on concept mapping assignment. In each round I have to rewrite or can I add more from the previous one?

Replied; One more puzzling issue.

By Tutor/Facilitator - Thursday, 4 August 2005, 09:01PM

Add to your previous concept map. All issues are related to others and directly connected to community pharmacy. I want all the subjects connected together. If you cannot use PowerPoint to draw this, you can handwriting and send it at the pharmacy administration department. I will scan and make it as a file for you- if the time is available.

Episode 6 (Tutor support)**Article is cool!!**

By 7 - Wednesday, 20 July 2005, 09:48PM



The additional document in unit 1 (Tutor's Nickname) you posted is really great. I do like it. I got new and enjoyable knowledge. If there would not have any qualify examination nearby, it would be more enjoyable.

Replied: article is cool!!

By Tutor/Facilitator - Friday, 22 July 2005, 06:13PM



Thank you.

5. Peer Support

Perceived peer support

The mean score of student's perceived peer support during the course is more than 3 (3.25 ± 0.82 with 3.17 ± 0.84 and 3.33 ± 0.81 of CLG and SCG respectively). The detail of each statement were presented in the Table 4.16

Table 4.16 Mean PSCE score in the aspect of peer support compared between groups

	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
Other students encourage my participation.	3.53	0.92	3.41	0.96	3.65	0.88
Other students praise my contribution.	3.02	0.94	2.86	0.83	3.17	1.03
Other students value my contribution.	3.33	0.98	3.27	0.98	3.39	0.99
Other students empathise with my struggle to learn.	3.11	1.05	3.14	1.08	3.09	1.04
Peer Support	3.25	0.82	3.17	0.84	3.33	0.81

Table 4.17 Students and mean PSCE score in the aspect of peer support compared between groups

	Total	CLG	SCG
Students perceived Peer Support less than or equal to 3 (3 → sometimes)	18	11	7
(Percentage)	40	50	30.43
Students perceived Peer Support more than 3 (3 → sometimes)	27	11	16
(Percentage)	60	50	69.56
Total	45	22	23

Fifty percent of the students in CLG perceived that the online community pharmacy course they involved, had the existence of peer support, which the mean score of the actual of peer support was more than 3 (3 represented to sometimes). In contrast, much more number of the SCG students (almost 70%) perceived that.

Evidence supported peer support

When one student posted his thought, he might expect someone to respond and this is the possible way of supporting. The pattern of discussion and feedback from students was suggested that a more free-flowing interaction was beneficial. Reaction or response posts were usually expected so that students might consider carefully what others thought or felt about what had been contributed. The number of exchange and support between each other in both groups during Implementation phase (III-IV) was shown in Table 4.18

Table 4.18 Number of posts during Phase III-Phase IV

		Mean±SD.	Mode	Range	P-Value (t-test) df = 43
	Total	0.91±0.29	1	0-1	
1	CLG	0.86 ±0.35	1	0-1	0.291
	SCG	0.96 ±0.21	1	0-1	
	Total	4.98 ±4.79	2	0-18	
2	CLG	6.32±5.87	2	0-18	0.072
	SCG	3.70±3.10	2	0-12	
	Total	1.07 ±1.36	0	0-6	
3	CLG	0.95 ±1.13	0	0-4	0.593
	SCG	1.17 ±1.56	0	0-6	
	Total	1.44 ±1.32	1	0-5	
4	CLG	1.55 ±1.37	1	0-5	0.622
	SCG	1.35±1.30	0	0-4	
	Total	8.53 ±6.29	6	0-23	
Total	CLG	9.82 ±7.55	6	0-23	
	SCG	7.30 ±4.64	5	1-21	0.189

1 Number of reflective thought posted per student in phase III-IV

2. Number of replies posted per student to reflect their friends' thought during phase III-IV

3 Number of first forum posted per student in the comprehensive phase

4 Number of forum replied per student in the comprehensive phase

* Equal variances not assumed

From Table 4.18, students in both groups were not significantly different in being ready to give and receive information with each other.

Students praised and valued their friends' contribution. For example;

Episode 1 (Peer support)

Replied: Franchise Focus *How to make a successful franchise**

CLG, Phase III

By 16 – Sunday, 18 September 2005, 04:47PM

Umm.. ? That is a good point, and some parts could be applied to general store, not only franchise drugstore such as having the good service, personnel attempt to work hard and honest, cabinet arranged for categorized medicines, promotion management, manager who understand marketing and business strategy etc.

Episode 2 (Peer support)

Replied: reflective thought from learning content unit II-IV

CLG, Phase III

By 1 – Saturday, 3 September 2005, 11:17PM

It is really nice that #38 (nickname) concluded the whole content from unit II-IV. I can see the overall image of those information from the course documents. My concept map is expanded now.

Episode 3 (Peer support)

Replied: location and product management in a drugstore.

By 21 – Sunday, 4 September 2005, 06:46PM

Thanks. #6 (nickname) for sharing. Your idea stimulated my thought.

Episode 4 (Peer support)

Replied: Reflective thought novel information from drugstore

By 24 – Thursday, 1 September 2005, 05:28PM

I have just known about setting the price like this. Moreover, I agree with a group purchasing. It is very interesting. In the future if I have my own drugstore, this method would be applied.

Episode 5 (Peer support)

Replied: Pals, May I dictate our group since today is the due date?

By 19 – Sunday, 18 September 2005, 08:00PM

Thanks #24 (nickname) to be our group representative who sent the complete assignment.

Episode 6 (Peer support)**Replied: Various problems in this drugstore**

By 1 - Monday, 12 September 2005, 01:43PM

The problem #25 (nickname) raised opens my vision. I have forgotten this aspect already. Thank you.

Episode 7 (Peer support)**Dear friends, please don't hesitate to help.**

By 21 - Thursday, 1 September 2005, 08:32PM

Please share your ideas with our group's friends. Afterward we will have extensive ideas.

I understand that you are so busy. I cheer you up.

6. Interpretation

Perceived interpretation

The mean score of student's perceived interpretation during the course is more than often to exist (4.13 ± 0.50 with 4.10 ± 0.55 and 4.16 ± 0.45 of CLG and SCG respectively). The detail of each statement were presented in Table 4.19

Table 4.19 Mean PSCE score in the aspect of interpretative compared between groups

	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
I make good sense of other students' messages.	4.07	0.69	4.09	0.68	4.04	0.71
Other students make good sense of my messages.	4.02	0.62	3.91	0.68	4.13	0.55
I make good sense of the tutor's messages.	4.13	0.66	4.23	0.69	4.04	0.64
The tutor makes good sense of my messages.	4.31	0.70	4.18	0.73	4.43	0.66
Interpretative (Making sense)	4.13	0.50	4.10	0.55	4.16	0.45

Table 4.20 Students and mean PSCE score in the aspect of interpretation compared between groups

	Total	CLG	SCG
Students perceived mean interpretation score less than or equal to 3 (3 → sometimes)	1	0	1
(Percentage)	2.22	0.00	4.35
Students perceived mean interpretation score more than 3 (3 → sometimes)	44	22	22
(Percentage)	97.78	100.00	95.65
Total	45	22	23

More than 95 % of the students in both groups perceived that the online community pharmacy course they involved, had the existence of interpretation, which the mean score of the actual of Interpretation was more than 3 (3 represented to sometimes).

Evidence supported Interpretation

This online course involved social (interpersonal) processes by a small group of students working together to complete a task designed to promote learning achievement. Thus, this strategy of learning involved the creation and interpretation of communications among persons/groups that might have different understandings and opinions, which in turn enhanced learning by allowing individuals to exercise, verify and improve their knowledge. It was assumed that students would read and interpret postings, as well as formulate and articulate their own opinions.

Students can discuss in some points they don't understand by asking their friends to focus more. On the other hand, the agreement the students posted can be referred that students understand others' ideas.

Episode 1 (Interpretation)

Replied:Reflective thought from learning content unit II-IV

CLG, Phase III

By 33 - Sunday, 4 September 2005, 10:17PM

In my opinion, our learning content didn't mention about market competition, competition strategy, competitor's strength and weakness analysis such as SWOT analysis. It would be useful for future marketing plan.

Replied:Reflective thought from learning content unit II-IV

By 9 - Sunday, 11 September 2005, 02:39PM

Explain more about SWOT analysis please.
Thank you in advance.

Replied:Reflective thought from learning content unit II-IV

By 33 - Sunday, 11 September 2005, 05:44PM

SWOT stands for Strengths, Weaknesses, Opportunities, Threats. This is to analyze situation for decision making. Strengths such as our drugstore have various medicines. The inventory control management is perfect. No experience of the medicines out of stock. These are our good point of our drugstore...(explanation)

Replied:Reflective thought from learning content unit II-IV

By 2 Tuesday, 27 September 2005, 02:27PM

#33 (nickname), you are so smart. You can explain SWOT very clearly, I see. At first, I have no idea about community pharmacy management since I have not done any business before. If I were a community pharmacist, my drugstore would be ruined. No confidence to manage my own drugstore. But from this online learning and reading pals' reflective thought, I have changed my mind. I want to

have my own drugstore. Drugstore image is sometimes in my thought. I know that what are the factors to be considered in the community pharmacy business. I think that this knowledge would be lasted so long because we don't study by reciting. We learn by ourselves; sharing ideas and authentic experiences (visiting real drugstore)

Episode 2 (Interpretation)

Replied: Pricing war

CLG, Phase III

By 16 - Wednesday, 31 August 2005, 06:58PM

I don't understand what #9 (nickname) said about "small but great" or "Jack, the Giant killer" what does it mean? Could you please clarify more? If my drugstore is small, I can survive, right?

Episode 3 (Interpretation)

Replied: Theory and drugstore management

SCG, Phase III

By 29 - Monday, 12 September 2005, 10:35AM

I agree to emphasize on providing good service and good customer relationship. Customers don't recognize new drugstore until they have an impressive experience there. It is a pleasant opportunity to have a role in a community. It is better than pricing competition. The result of pricing competition is not good for business. If you want to compete, competing in other aspects would be nice.

Episode 4 (Interpretation)

Replied: Reflective thought

SCG, Phase III

By 20 - Monday, 12 September 2005, 09:25AM

I do agree. Nowadays more competition exists, there are many choices for customers to select. Hence, CRM strategy is important. The hardest procedure is customers' retaining. We have to do all methods to keep up our customers. It is too complicated.

Episode 5 (Interpretation)

Replied: Numerous Problems in this drugstore

CLG, Phase IV

By 1๓๘ 25 - Wednesday, 7 September 2005, 05:34PM

I agree with #1 (nickname), but I would like to add more. In my opinion, the service of this drugstore would be in trouble. It would be difficult to find medicines in this messy area. Customer would spend more time for dispensing. I am curious to know if this drugstore is an actual one. How can it pass through the regulation or the quality control process? I am very confused.

Episode 6 (Interpretation)**Replied: Messy Drugstore**

SCG, Phase IV

By 4 - Friday, 2 September 2005, 11:20AM

Agree with #40 and #6 (nickname) about the unorganized and messy drugstore. I am wondering how long for each customer to wait for dispensing, how can the owner discover the medicines, Too many medicines, might be all the items in the world.

Replied: Messy Drugstore

By 23 - Friday, 2 September 2005, 01:22PM

May I add more to #40 (nickname) answer? The consequence of this messy drugstore would be the reduction in customers' trust then customers don't want to make a deal with.

3.2 Compared the existence of social constructivist environment between 2 strategies; Collaborative and Scaffolding (CLG and SCG)

The result of the mean perceived score of SCE of this online community pharmacy of CLG and SCG was presented in Table 4.21

Table 4.21 Mean PSCE score in all aspects compared between groups

	CLG		SCG	
	Mean	SD.	Mean	SD.
Relevance	4.02	0.58	3.88	0.64
Reflective Thinking	3.85	0.76	4.11	0.57
Interactivity	3.40	0.91	3.33	0.84
Tutor Support	3.69	0.78	3.96	0.87
Peer Support	3.17	0.84	3.33	0.81
Interpretative	4.10	0.55	4.16	0.45
Social constructivist environment score	3.71	0.53	3.79	0.53

It was shown that the perceived social constructivist environment of those 2 groups existed and after those data were analyzed by statistical method, it was shown that CLG and SCG did not differ from each other. Figure 4.5 presented the profile plots of mean Perceived Social Constructivist Environment (PSCE) score in all aspects of COLLES compared between CLG and SCG. Tests of within-subjects effects showed that there was no interaction effect between aspects and groups. Tests of between-subjects effects presented that group did not effect to the score of PSCE.

Table 4.22 Mean PSCE score compared between Strategy (Repeated measure analysis with groups and aspects)

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
GROUP	0.596	1	0.596	0.304	0.584	
Within GROUP	84.242	43	1.959			
Tests of Within-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
ASPECT	0.276	1	0.276	2.238	0.142	
ASPECT x GROUP	0.11	1	0.11	0.895	0.349	
ASPECT x Within	5.294	43	0.123			

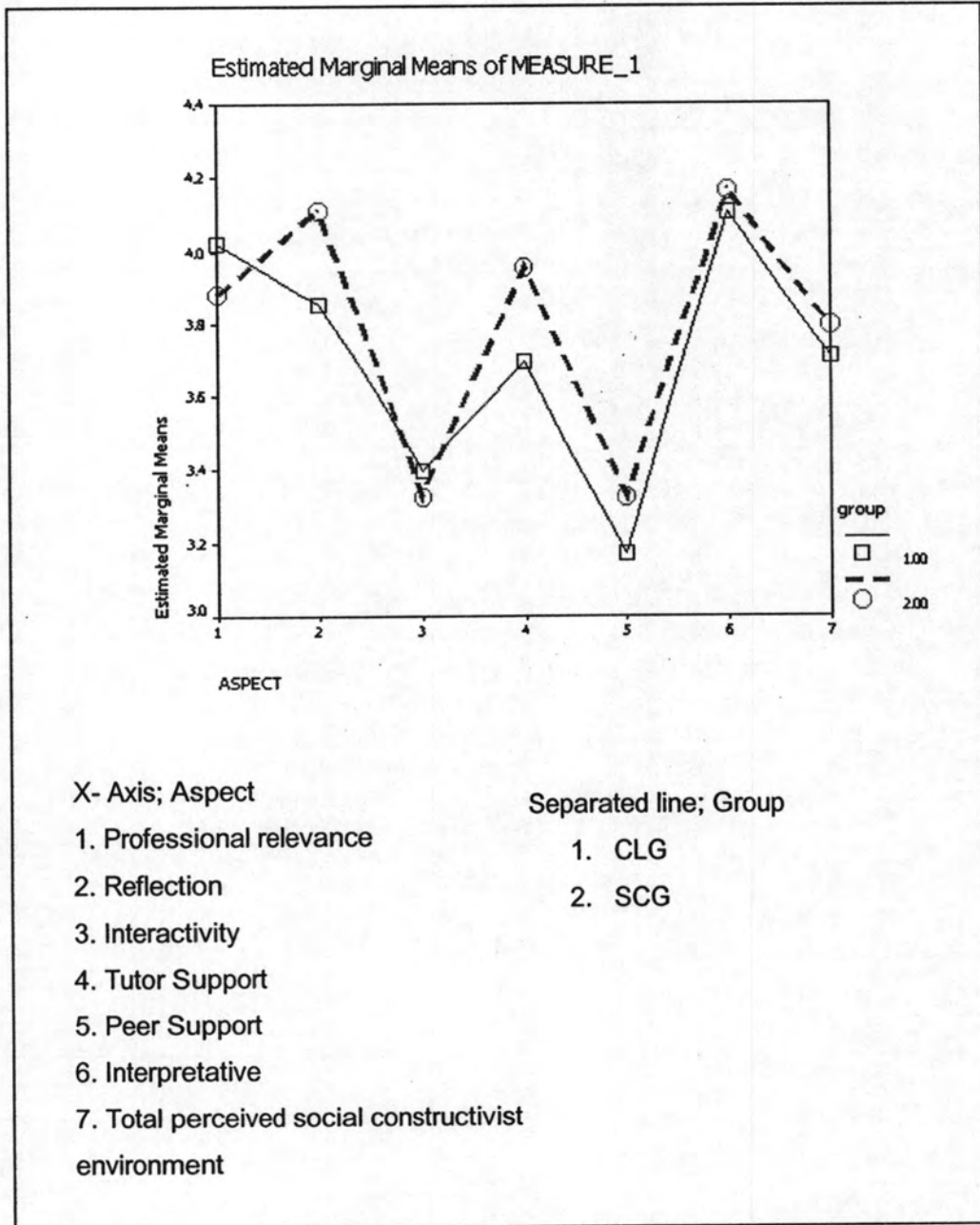


Figure 4.5 The profile plots of mean (PSCE) score in all aspects of COLLES compared between CLG and SCG

3.3 Compared the preferred and actual (perceived) score of social constructivist environment between 2 strategies; Collaborative and Scaffolding (CLG and SCG)

To understand what extent are students satisfied with the learning environment at the end of the course? This study compared results of the final form of the combined preferred and actual forms of the COLLES. Paired T Test was applied to analyze how different it was between the score of actual and preferred students perceived.

Table 4.23 Compared preferred and actual forms of the COLLES between CLG and SCG

Aspect		Total				CLG				SCG			
		Mean	SD	df	P	Mean	SD	df	P	Mean	SD	df	P
Relevance	Preferred	4.00	0.65			3.91	0.70			4.09	0.62		
	Actual	3.95	0.61	44	0.692	4.02	0.58	21	0.499	3.88	0.64	22	0.278
Reflection	Preferred	3.37	0.90			3.08	0.87			3.65	0.84		
	Actual	3.98	0.67	44	0.00*	3.85	0.76	21	0.00*	4.11	0.57	22	0.00*
Interaction	Preferred	3.17	0.81			2.98	0.80			3.36	0.79		
	Actual	3.36	0.86	44	0.251	3.40	0.91	21	0.078	3.33	0.84	22	0.887
Tutor Support	Preferred	3.56	0.65			3.47	0.72			3.65	0.58		
	Actual	3.83	0.83	44	0.056	3.69	0.78	21	0.329	3.96	0.87	22	0.066
Peer Support	Preferred	3.18	0.76			3.15	0.79			3.21	0.74		
	Actual	3.25	0.82	44	0.552	3.17	0.84	21	0.902	3.33	0.81	22	0.468
Interpretation	Preferred	3.98	0.82			3.86	0.97			4.09	0.65		
	Actual	4.13	0.50	44	0.256	4.10	0.55	21	0.336	4.16	0.45	22	0.567
Total perceived social constructivist learning environment	Preferred	3.75	0.52			3.71	0.53			3.79	0.53		
	Actual	3.54	0.57	44	0.048*	3.41	0.60	21	0.066	3.67	0.51	22	0.386

*Sig. (2-tailed) $P < 0.05$

Total social constructivist environment. The result was presented that the total score of actual social constructivist environment measured by COLLES was not different from the preferred one. The students perceived that actual social constructivist environment existed in this online course similar to their expectation. (CLG vs SCG $P=0.066,0.386$)

Professional relevance. The expectation of students' professional relevance of this online course was nearly fulfilled in all groups. The preferred and actual score was not different significantly. (CLG vs SCG $P=0.499, 0.278$).

Reflection. When the score of the student expected the course to facilitate reflective thinking was compared to the actual score the students perceived, the finding was found that the occurrence of students' reflective thinking was higher than they expected in all groups. (CLG vs SCG $P=0.0003,0.007$)

Interactivity. The occurrence of students' interaction was not significantly different from what they expected in all groups (CLG vs SCG $P=0.078, 0.887$). Spectacularly, the mean score of actual interaction was less than the preferred in the SCG group.

For the aspects of Tutor support, Peer support and Interpretation, the occurrence of those aspects was higher than what students expected but not significantly different in all groups (Table 4.22).

As results were presented above, perceived social constructivist environment of those 2 groups existed and did not differ from each other.

Part 4 Performance

4.1 Learning Achievement

4.1.1 Immediate learning achievement

4.1.2 Retained learning achievement

Assessment in online community pharmacy course was summative; facilitator provided students with a final examination to assess learning achievement.

The final examination was related to materials addressed in this online course. The comprehensive 80-item objective related directly to the community pharmacy content. The same examinations were given two times to students who enrolled in this course. The first was at the completion of the online course without any notified before. The second time was to assess the knowledge retained. It was done after the course had been finished for 5 months.

The number of student who participated in the first and second examination was 45 and 36 respectively (100% and 80%).

The examination score in this part was presented as a percentage total score and also was categorized into percentage score according to the unit of content and Bloom's Taxonomy. The first 2 parts were to explore all competencies students attained from the course. The last part was to compare the difference of the two groups (strategies).

4.1.1 Immediate learning achievement; The first time examination

The percentage score of each Unit of the first time examination was shown in Table 4.24

Table 4.24 Mean percentage score of the first exam compared between CLG and SCG (categorized by unit and by Bloom's taxonomy)

The first time score	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
Unit I	68	19.26	68.18	21.96	67.83	16.78
Unit II	64.25	9.98	66.21	9.76	62.38	10.04
Unit III	63.76	8.22	64.34	9.21	63.21	7.32
Unit IV	67.18	8.1	67.66	5.65	66.72	10.02
Knowledge (Kn)	58.89	16.99	60.23	17.09	57.61	17.16
Comprehension (Cp)	70.97	9.62	72.16	10.16	69.84	9.16
Application (Ap)	69	8.09	69.77	8.23	68.26	8.06
Analysis (An)	58.48	11.18	60.53	12.02	56.52	10.19
Synthesis (Ss)	67.7	13.7	66.97	13.87	68.41	13.81
Evaluation (Ev)	54.44	29.81	54.55	30.51	54.35	29.82
Kn-Cp	66.94	8.9	68.18	8.68	65.76	9.14
Ap-Ev	64.56	6.79	65.34	7.18	63.82	6.47
Total	65.28	6.15	66.19	5.92	64.4	6.36

From the data above, both groups got the highest percentage score from the content of unit I, next below of content unit IV. The least score of CLG came from content unit III and of SCG came from content unit II.

Both groups had the highest and lowest percentage score of the exam categorized by Bloom's taxonomy very similar. Those were the comprehensive and evaluation level for highest and lowest respectively. The result of online learning achievement assessed by this examination was revealed that students could get the percentage score of combined Kn-Cp and Ap-Ev in Bloom's Taxonomy approximately 65%.

4.1.2 Retained learning achievement;

4.1.2.1 The second time examination; general result.

The percentage score of each Unit of the second time examination was shown in Table 4.25

Table 4.25 Mean percentage score of the second exam compared between CLG and SCG (categorized by unit and by Bloom's taxonomy)

The second time score	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
Unit I	67.78	24.97	73.33	31.44	62.22	15.17
Unit II	58.09	17.73	58.45	21.83	57.73	13.07
Unit III	52.78	16.33	53.42	16.31	52.14	16.8
Unit IV	57.91	18.52	57.05	19.04	58.76	18.51
Knowledge (Kn)	49.65	20.37	43.75	16.18	55.56	22.78
Comprehension(Cp)	61.98	18.14	61.11	20.17	62.85	16.39
Application(Ap)	59.17	18.42	61.67	19.55	56.67	17.41
Analysis(An)	53.22	17.6	53.8	18.28	52.63	17.41
Synthesis(Ss)	57.96	18.57	58.52	22.7	57.41	13.94
Evaluation(Ev)	50	33.81	61.11	40.42	38.89	21.39
Kn-Cp	57.87	16.24	55.32	17.14	60.42	15.34
Ap-Ev	56.5	16.17	58.13	18.51	54.86	13.79
Total	56.91	15.65	57.29	17.76	56.53	13.73

From the data above, both groups got the highest and lowest percentage score of the second time examination very similar (the content of unit I, and unit III respectively).

Focus on Bloom's Taxonomy; the percentage of second time score was not similar to the first one. The lowest percentage score of CLG was in knowledge level, while of SCG was still in evaluation level. The result of online learning achievement assessed by the second time examination was mostly reduced. Students could get

the second time percentage score of combined Kn-Cp and Ap-Ev in Bloom's Taxonomy approximately 60%.

4.1.2.2. Compare the first and the second time score of the two groups.

The general results of the first and the second time score of examination were presented in Table 4.26 These were data of students who participated on both times examination (Total N=36)

Table 4.26 Mean percentage score of the first and second exam

Examination	Percentage	Total	CLG	SCG
The first time total score (N=45)	Mean± SD	65.66±6.47	65.97±6.48	65.35±6.63
	Range	52.50-75.00	52.50-75.00	55.00-75.00
	T test between CLG and SCG			df =43 P=0.334
The second time total score (N=36)	Mean± SD	56.91±15.65	57.29±17.76	56.53±13.73
	Range	11.25-76.25	11.25-76.25	16.25-72.5
	T test between CLG and SCG			df =34 P= 0.886

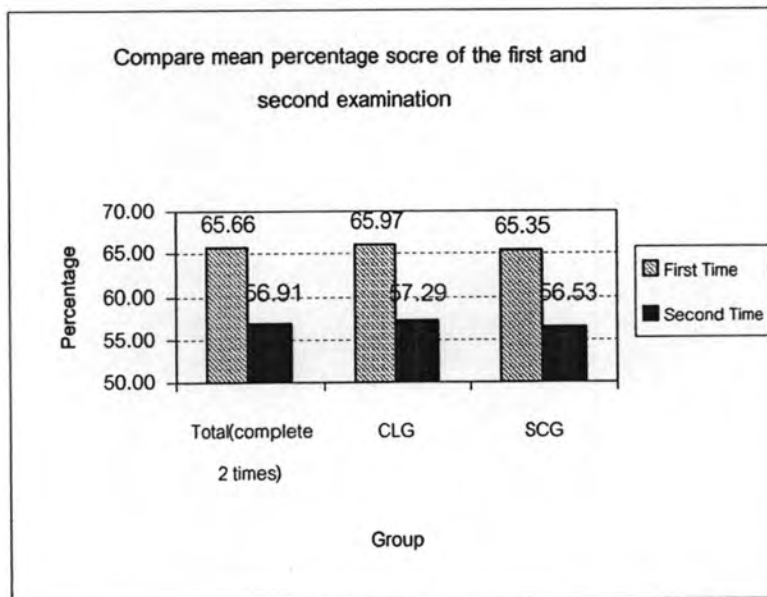


Figure 4.6 Mean percentage score compared between the first and second exam

The mean percentage score of both groups (CLG and SCG) were reduced when the time passed (Figure 4.6). After Pair t test was applied to measure if there was any significant difference of the mean total percentage score between the first and the second time test. The result was shown that overall students who participated in both examinations had their total percentage score remarkably decreased. (df=43, P=0.003).

To calculate the percentage of the retained learning achievement after 5 months, the formula (A) was applied.

Formula(A);

$$\text{Percent of retained learning achievement} = \text{Second time score} * 100 / \text{First time score}$$

Each student who participated in both time examinations would have the percent of retained score. The mean percent of retained learning achievement of CLG and SCG was shown in Table 4.27

Table 4.27 Mean percent of retained learning achievement

	Total		CLG		SCG		P
Percent of retained	Mean	SD	Mean	SD	Mean	SD	df =34
Total	87.44	24.25	87.79	27.9	87.08	20.78	0.932

It was found that retained learning achievement score after 5 months finished the online community pharmacy course was close to 87%. Percent of retained of CLG and SCG were not significantly different (Independent T Test P= 0.932).

Table 4.28 Mean percent of retained learning achievement compared between groups (categorized by unit and by Bloom's taxonomy)

Percentage	Total		CLG		SCG	
	Mean	SD	Mean	SD	Mean	SD
Unit I	106.25	47	112.96	48.69	99.54	45.64
Unit II	92.63	31.13	91.83	35.29	93.43	27.36
Unit III	83.56	29.87	84.67	32.09	82.46	28.38
Unit IV	87.38	29.13	85.52	29.21	89.23	29.78
Knowledge (Kn)	93.13	55.12	78.29	39.08	107.96	65.28
Comprehension (Cp)	87.84	27.44	86.55	28.96	89.13	26.61
Application (Ap)	85.81	27.14	91.21	29.79	80.42	23.82
Analysis (An)	95	38.99	91.98	37.77	98.02	41.04
Synthesis (Ss)	90.48	35.33	91.15	37.18	89.8	34.45
Evaluation (Ev)	87.5	63.5	110	76.06	67.65	43.09
Kn-Cp	87.04	26.17	82.79	27.91	91.29	24.35
Ap-Ev	88.11	26.03	90.57	30.14	85.65	21.78
Total	87.44	24.25	87.79	27.9	87.08	20.78

From the data of retained learning achievement, both groups got the highest and lowest percentage score retained learning achievement very similar (the content of unit I, and unit III respectively).

Focus on Bloom's Taxonomy; the percentage of retained learning achievement score the lowest percentage score of CLG was in knowledge level, while of SCG was still in evaluation level. The highest of retained learning achievement of CLG was in evaluation and SCG was in knowledge level.

How different in the learning achievements there were between CLG and SCG?

Additional analysis to test hypothesis that mean exam score of the student who study concentrate on only one assigned unit and those who did not. Mean score of unit II was compared between SCG subgroup-1 and others. Mean score of unit III was compared between SCG subgroup-2 and others. Mean score of unit IV was also compared between SCG subgroup-3 and others.

The Independent T Test was used. The result was presented as follows.

(Table 4.29)

Table 4.29 Mean percentage of the examination score compared between groups of students who concentrated in assigned unit and those who did not.

		No of		No of				
		(1)	MEAN	SD	(2)	MEAN	SD	P
First Time Score	Unit II	SCG-1=6	66.67	14.20	Other=30	63.91	9.77	0.563
	Unit III	SCG-2=6	60.90	8.57	Other=30	65.26	7.52	0.286 ^a
	Unit IV	SCG-3=6	66.67	7.94	Other=30	67.56	8.84	0.819
<hr/>								
Second Time								
Score	Unit II	SCG-1=6	63.04	10.91	Other=30	57.10	18.79	0.462
	Unit III	SCG-2=6	44.23	23.80	Other=30	54.49	14.36	0.163
	Unit IV	SCG-3=6	69.87	7.46	Other=30	55.51	19.21	0.083

1 students concentrated assigned unit

2 student who did not concentrated

^aEqual variances not assumed

It was shown that SCG who concentrated in only one assigned unit, did not get the examination score different from those who did not.

Repeated measure analysis (Randomized block design)

After repeated measure analysis was applied to confirm whether group (strategy) had the effect to the examination score categorized by Bloom's Taxonomy, the results revealed in Table 4.30 and Figure 4.7

There was **no main effect** to the score of the examination but there was an interaction effect of Bloom's Taxonomy, Time of test and groups (strategies) ($P < 0.05$)

Table 4.30 Repeated measure of examination score by strategy and Bloom's Taxonomy

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Intercept	1529337.37	1	1529337.37	1497.005	0.000	
GROUP	97.34	1	97.34	0.095	0.759	
within	34734.34	34	1021.60			
Tests of Within-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Bloom	11917.49	3.29	3625.64	11.008	0.000	
Bloom x GROUP	929.75	3.29	282.86	0.859	0.473	
within(Bloom)	36810.39	111.76	329.38			
TEST	7509.69	1	7509.69	8.561	0.006	
TEST x GROUP	316.11	1	316.11	0.360	0.552	
within(TEST)	29826.19	34	877.24			
Bloom x TEST	330.62	2.45	135.21	0.232	0.835	
Bloom x TEST x GROUP	6410.62	2.45	2621.64	4.499	0.009	
within(Bloom x TEST)	48449.25	83.14	582.75			

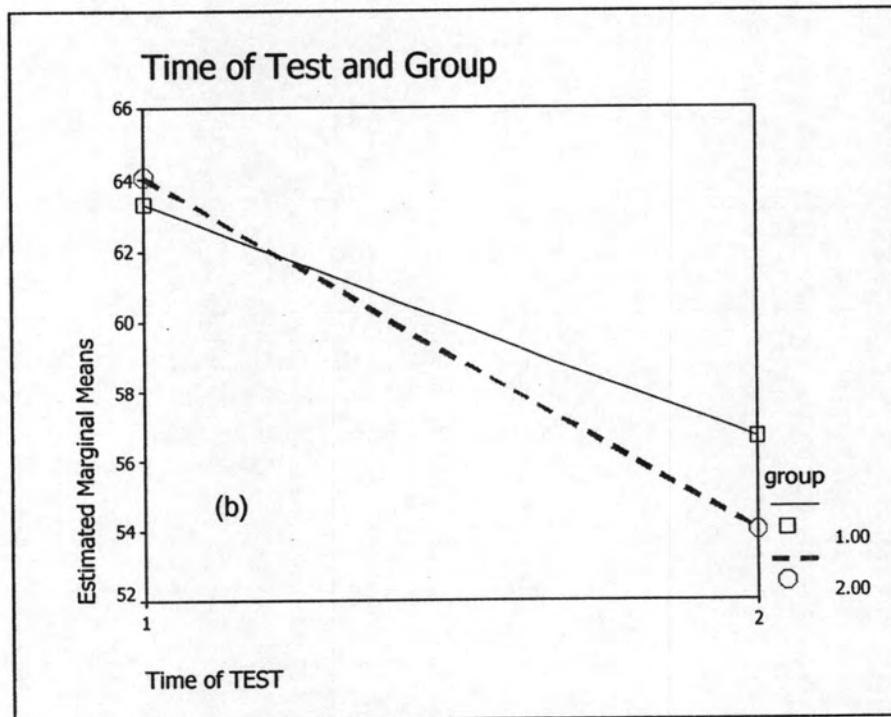
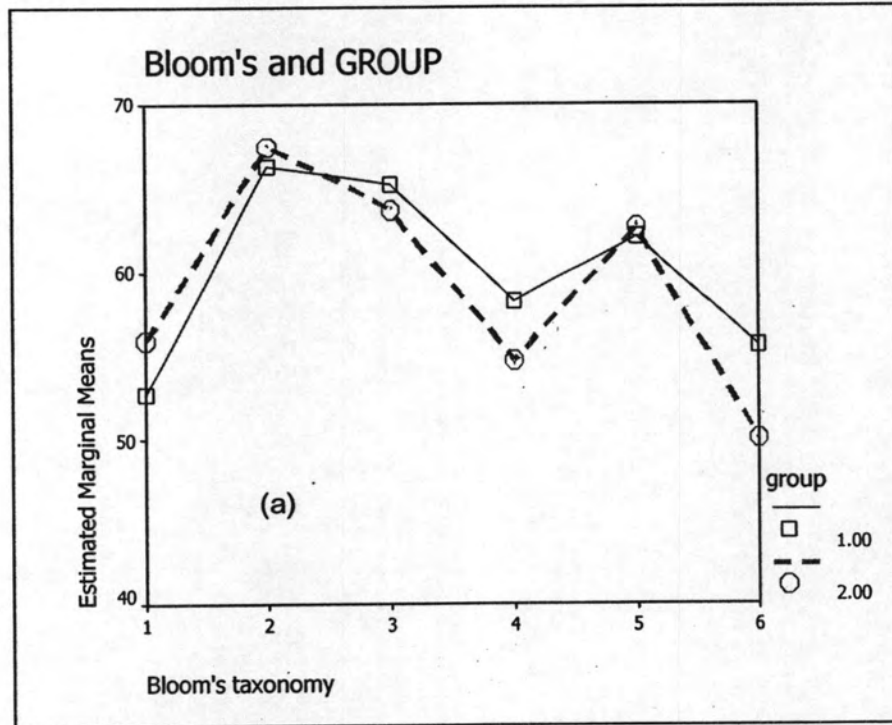


Figure 4.7 (a)-(f) The profile plots of estimated marginal mean of exam score in all Bloom's Taxonomy compared between CLG and SCG

Bloom x Group x Time of TEST

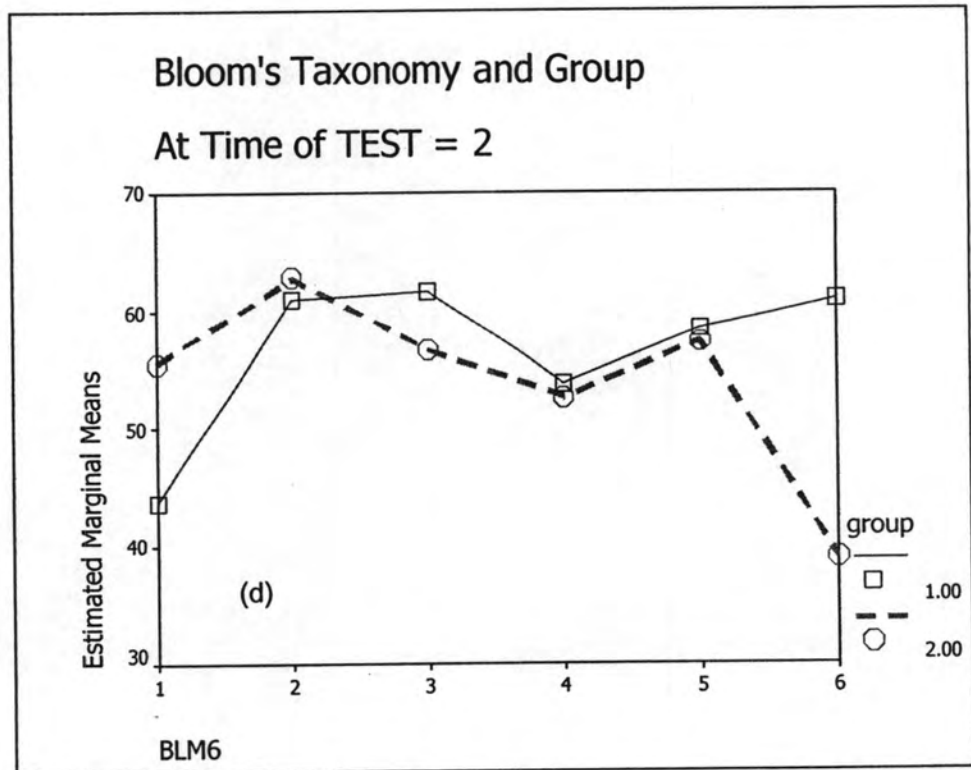
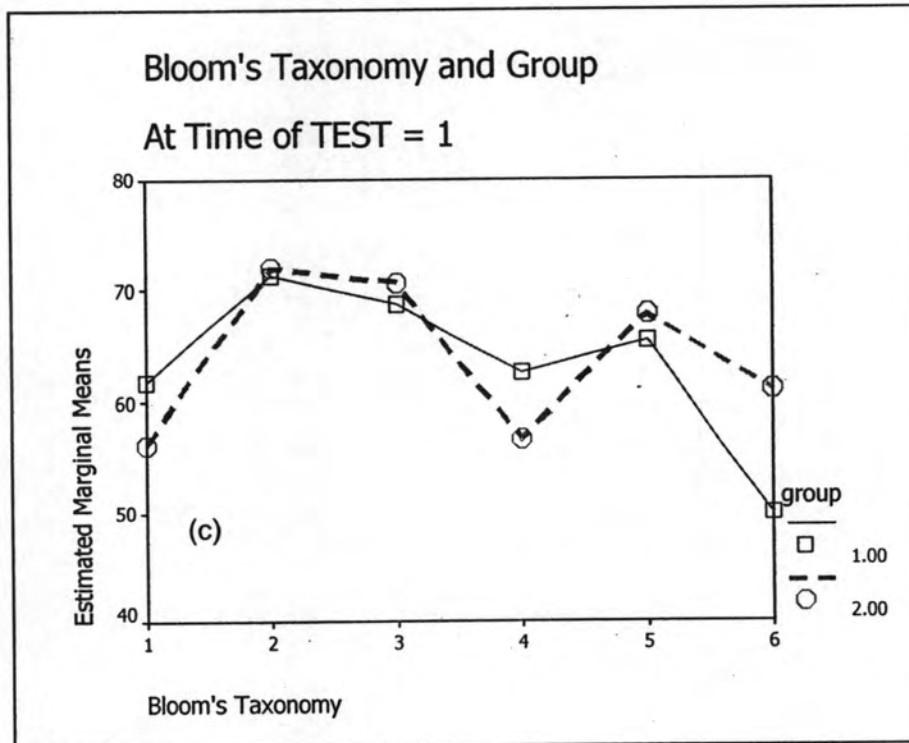


Figure 4.7 (a)-(f) The profile plots of estimated marginal mean of exam score in all Bloom's Taxonomy compared between CLG and SCG

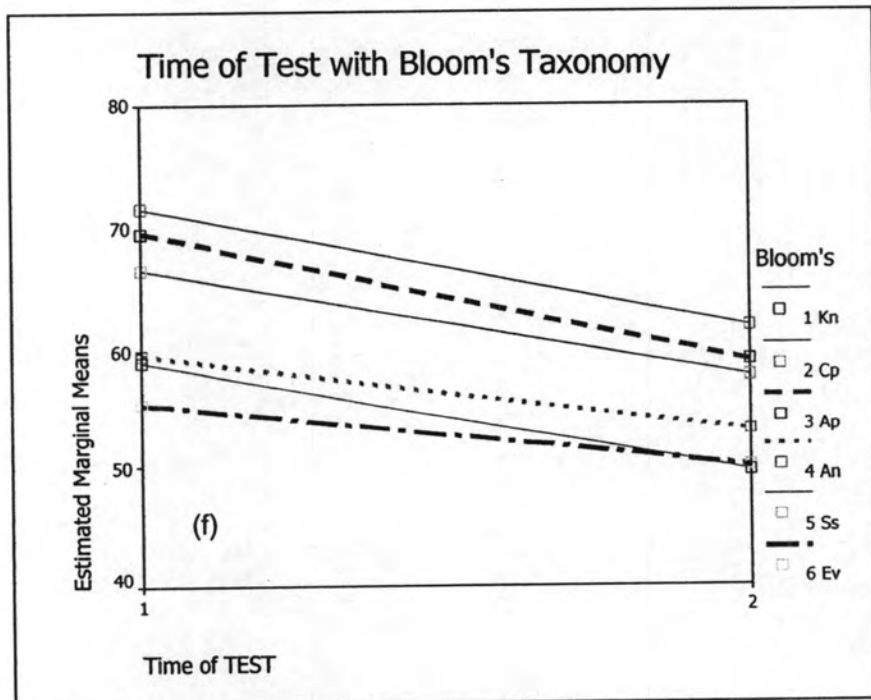
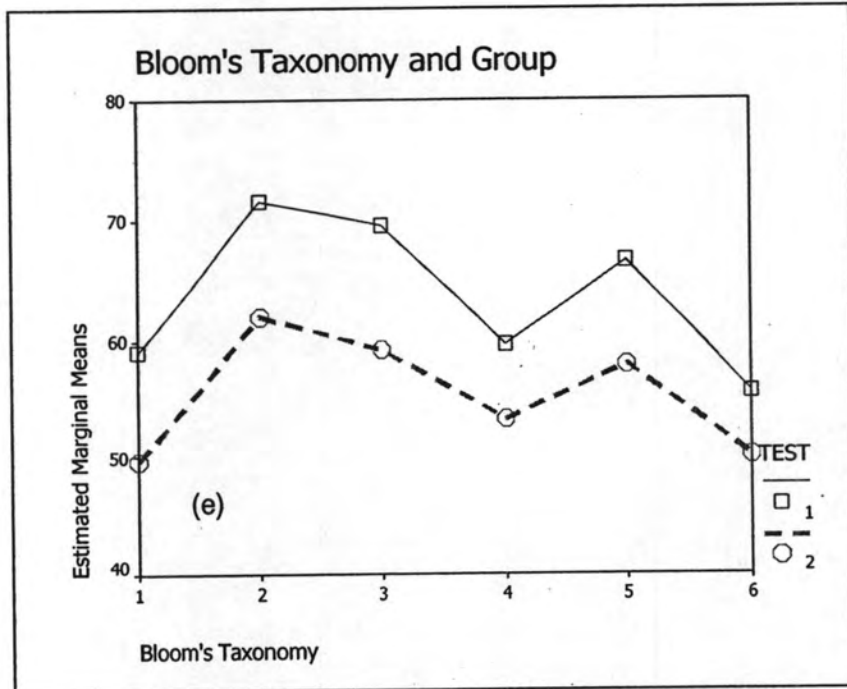


Figure 4.7 (a)-(f) The profile plots of estimated marginal mean of exam score in all Bloom's Taxonomy compared between CLG and SCG

When modified Bloom's Taxonomy was applied as an dependent variables (grouping the skills into 2 level; lower and higher skills), the results were shown in Table 4.31 and Figure 4.8 (a)-(d)

Table 4.31 Repeated measure of examination score by group and modified Bloom's Taxonomy (lower and higher skills)

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Intercept	547570.6	1	547570.64	1819.45	0.000	
GROUP	0.039368	1	0.04	0.00	0.991	
Within	10232.44	34	300.95			
Tests of Within-Subjects Effects						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
BLOOM2	130.1591	1	130.16	5.07	0.031	
BLOOM2 x GROUP	119.087	1	119.09	4.64	0.038	
Within(BLOOM2)	872.3171	34	25.66			
TEST	2891.196	1	2891.20	10.29	0.003	
TEST x GROUP	27.6459	1	27.65	0.10	0.756	
Within(TEST)	9549.448	34	280.87			
BLOOM2 x TEST	10.07811	1	10.08	0.26	0.612	
BLOOM2 x TEST x GROUP	201.257	1	201.26	5.25	0.028	
Within(BLOOM2 x TEST)	1304.573	34	38.37			

Bloom2 = lower and higher skills

The result showed that the main effect –group- had no effect to the mean exam score categorized by modified Bloom's Taxonomy. There was an interaction effect of modified Bloom's Taxonomy to the mean exam score. The time of test also had another effect to the mean exam score. ($P < 0.05$)

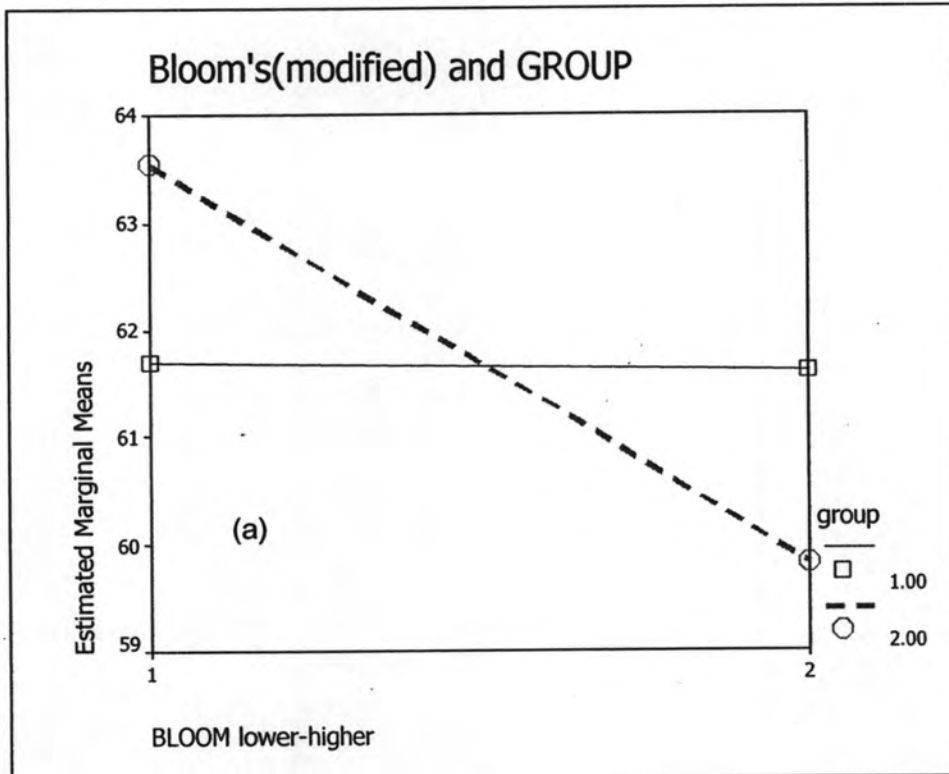
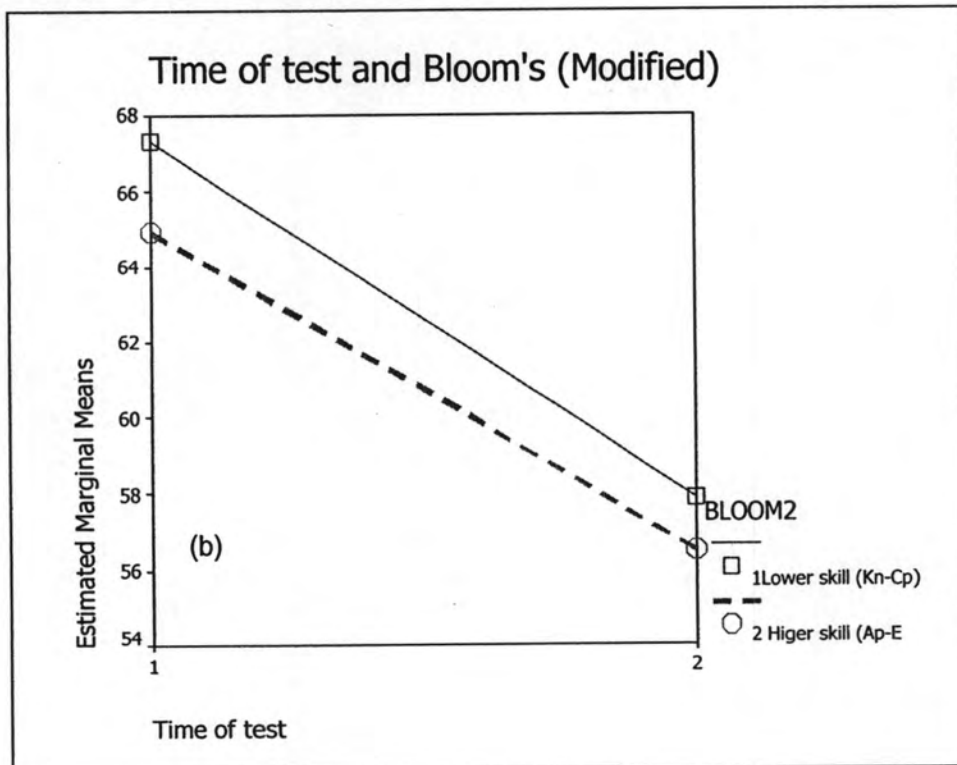


Figure 4.8 (a)-(d) The profile plots of mean exam score in modified Bloom's Taxonomy compared between CLG and SCG



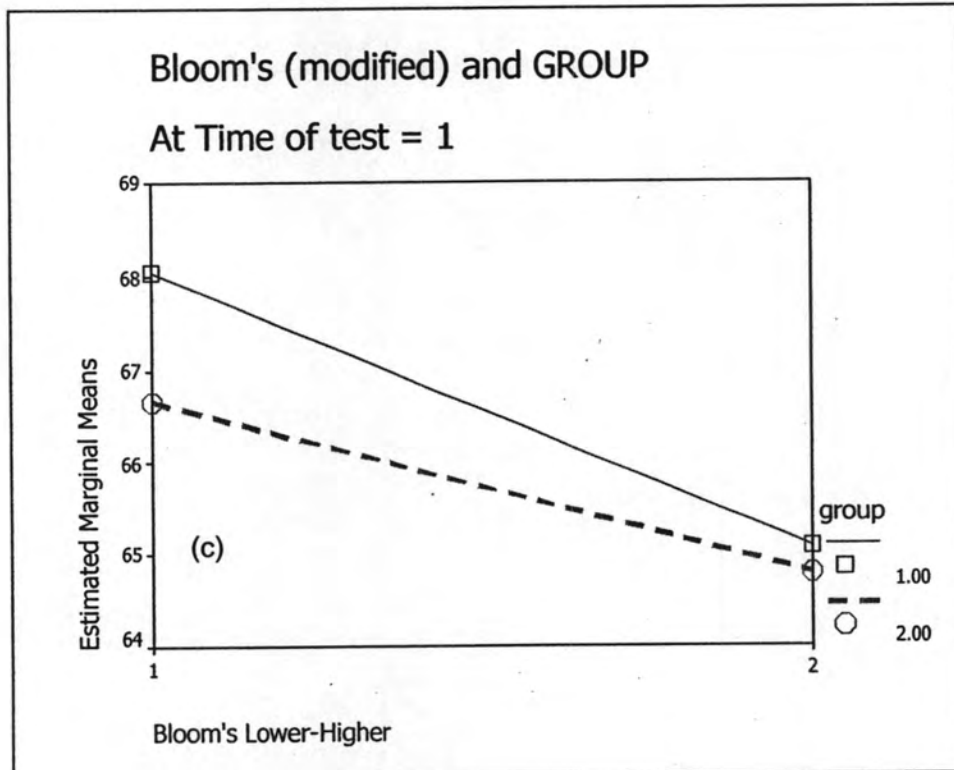
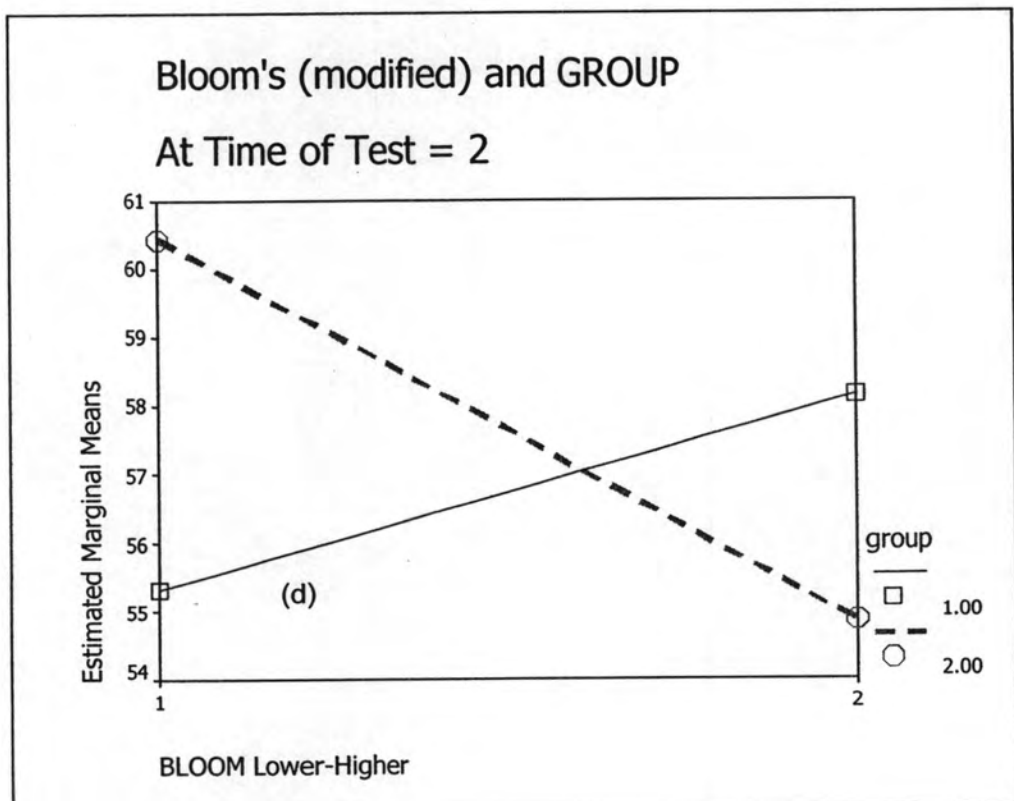


Figure 4.8 (a)-(d) The profile plots of mean exam score in modified Bloom's Taxonomy compared between CLG and SCG



4.2. Participation Process

4.2.1 Time spent and Number of hits during the course.

Student's time consumed on the web in this study was manually calculated. The assumption was made that the duration each student spent was less than one hour per activity. Duration periods of all activities were summed up to be total time spent on community pharmacy web. A hit was also counted for every element (e.g., document, forums) included on the web pages. The result was shown in Table 4.32

Table 4.32 Time spent and number of hits during the course

	Total				CLG				SCG			
	Min	Max	Mean	SD.	Min	Max	Mean	SD.	Min	Max	Mean	SD.
Total time spent	520	3298	1358.29	611.42	521	3298	1446.18	703.41	520	2351	1274.22	510.15
	P= 0.351											
Time on content related activities	230	2093	894.62	421.95	230	2093	926.55	482.02	316	1553	864.09	363.73
	P= 0.625											
Number of Hit	11	88	42.18	16.86	11	88	45.05	19.39	17	61	39.43	13.92
	P= 0.269											

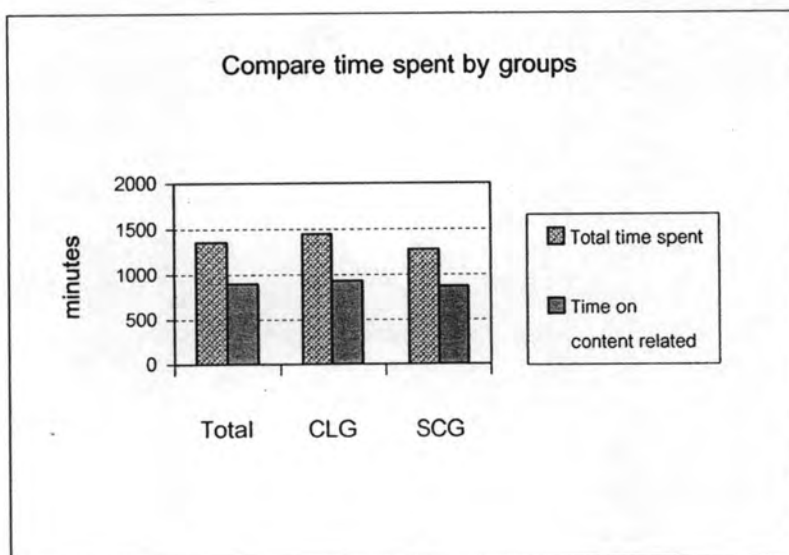


Figure 4.9 Compared time spent by groups

The average time spent on overall web course of CLG was about 24 hours while that of SCG was 21 hours. The web contained both content related and non-content related (for students to chitchat in order to simulate the genuine classroom atmosphere). The percentage of time student surf on the content related activities was 64.07 vs. 67.81% of the total time they spent (CLG and SCG respectively). Both groups were not significantly different in both time spent and the number of hits.

4.2.2 Participation process according by learning phase

As mentioned in the course formation that this community pharmacy online course was divided into 4 phases. The result of participation process data would be provided in accordance with that division.

Phase I

This is the course orientation phase. The students were asked to meet face to face. The questionnaires for assessing students' characteristic were also provided. In this phase all students participated (45,100%)

Phase II

The main objective of this phase is for Moodle – software orientation. There were various activities both face to face (at the beginning) and computer mediated communication (at the end of the phase). The activities were

1. Studying Moodle in computer laboratory. All students participated (45,100%)
2. Practicing skills in using many features of Moodle for being familiar with the program. Moreover, the online learning skills such as writing and sharing online were exercised. Various posting forums were assigned in sequence as
 1. "What's your expectation?"
 2. "Think Aloud"
 3. "Reflective Thought"

All students participated as well. The participation rate is in Table 4.33

Table 4.33 Participation during phase II

	Total posted	No.forum posted/student			Percentage of participating persons
		Range	Mean	SD	(%)
1."What's your expectation?"	74	1-6	1.64	1.26	100
2. "Think Aloud"-(1)	169	1-15	3.76	3.10	100
3. "Think Aloud"-(2)	235	1-12	5.22	3.18	100
4. "Reflective Thought"	170	1-11	3.78	2.66	100

Did CLG and SCG differ from each other focus on participation in phase II activities?

Table 4.34 was shown that there was not any significantly difference between CLG and SCG in percentage participation of phase II. ($P>0.05$)

Table 4.34 Participation during phase II compared between CLG and SCG

	CLG		SCG		P; T-Test
	Mean	SD.	Mean	SD.	df=43
"What's your expectation?",	2.46	2.07	2.00	1.28	0.373
"Think Aloud"-(1)	2.69	2.15	1.78	1.37	0.095
"Think Aloud"-(2)	2.53	1.39	1.92	1.28	0.133
"Reflective Thought"	2.22	1.53	2.23	1.63	0.990

Phase III

The main objective is for students to achieve “knowledge acquisition phase”. The activities in this phase were “problem solving” “quiz” and “concept mapping”. The participation appearance of student was in the Table 4.35

Table 4.35 Participation during phase III compared between subgroups

PBL						
	No.forum posted	Min/studen t	Max/studen t	%post /student	SD	Percentage of participating persons
CLG-1	58	0.00	22.41	12.50	8.83	75
CLG-2	51	5.88	25.49	14.29	7.98	100
CLG-3	27	0.00	29.63	14.29	9.43	85.71
SCG-1	43	4.65	27.91	12.50	8.52	100
SCG-2	54	0.00	24.07	12.50	9.53	87.5
SCG-3	25	0.00	24.00	14.29	7.95	85.71

Quiz						
	time pre-post	Min	Max	Mean	SD	% participating person(all quiz)
CLG-1	6	2	6	5.38	1.41	75.00
CLG-2	6	5	6	5.71	0.49	71.43
CLG-3	6	0	6	4.71	2.36	71.43
SCG-1	2	1	2	1.88	0.35	87.50
SCG-2	2	2	2	2.00	0.00	100
SCG-3	2	1	2	1.86	0.38	85.71

Concept map						
	time sent	Min	Max	Mean	SD	% participating person(all round sent C-Map)
CLG-1	4	2	4	3.50	0.93	75.00
CLG-2	4	3	4	3.80	0.38	85.71
CLG-3	4	4	4	3.94	0.15	100(one late)
SCG-1	4	4	4	4.00	0.00	100
SCG-2	4	3	4	3.90	0.28	87.50
SCG-3	4	4	4	3.94	0.15	100(one late)



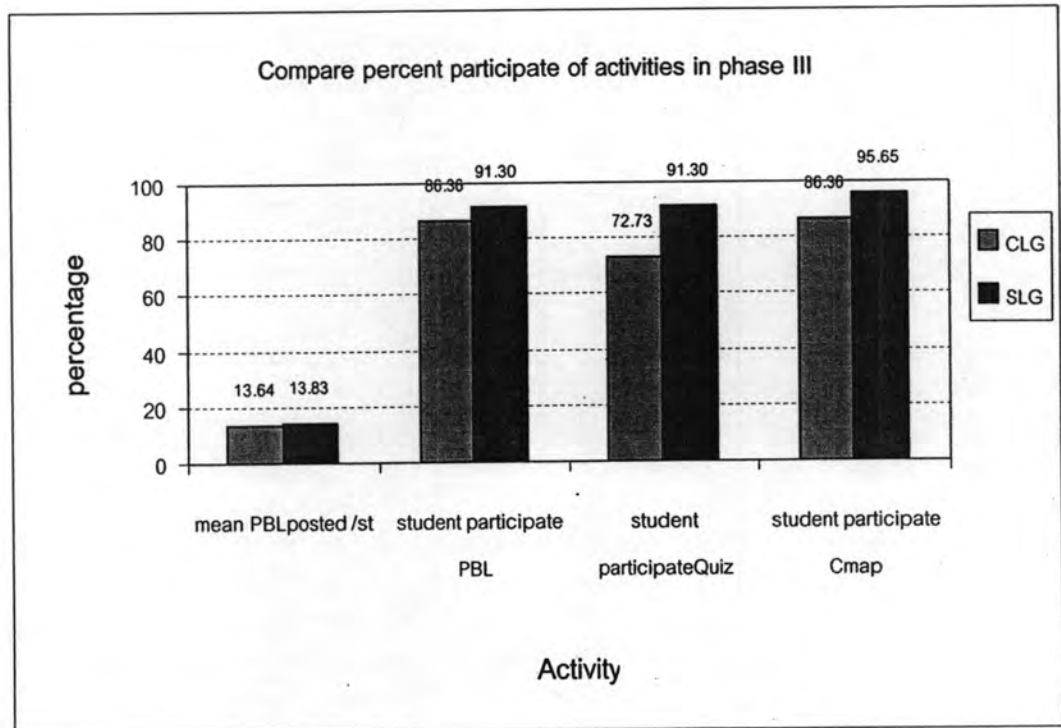


Figure 4.10 Compared activity participation during phase III

SCG students had a chance to do the quiz less than CLG because they were planned to study in only one unit during this phase. (One unit contained pre and post test; two time quiz). SCG students had a whole phase to finish those two, whereas CLG had the same period of time to finish as much as six tests.

There was no significantly different of percentage PBL posts per student between CLG and SCGG ($P=0.813$) by independent T test. Statistical Analysis by Chi -square was also employed to measure how different between numbers of students participated in each activity between CLG and SCG. It was found that there was no significantly difference (Quiz; Chi square Fisher's Exact Test $df.=1$ Exact Sig. (2-sided) $P=0.135$, Concept map; Chi square Fisher's Exact Test $df.=1$ Exact Sig. (2-sided) $P=0.187$).

Phase IV Comprehensive phase.

Before starting to this phase, the facilitator assigned students in both groups shared their interested issues in their previous content with peers by posting "Reflective thought-2" activity. Finally, all students joined their new subgroup to solve the assigned problem.

Table 4.36 Participation in Reflective thought (2) during phase IV compared between subgroups

	No. forums posted	Min/student	Max/student	Mean/student	SD	Percent participating student	
						person	participated
CLG	139	0	13.67	4.55	4.15	19	86.36
SCG	117	0	14.53	4.35	3.48	21	91.30

Table 4.37 Participation in PBL (2) during phase IV compared between subgroups

	total posted	Min	Max	Mean	SD	Number	
						student participated	% student participated
CLG-N1	29	3.45	27.59	14.29	9.00	7	100
CLG-N2	16	0.00	43.75	12.50	17.68	5	62.5
CLG-N3	16	6.25	18.75	14.29	4.72	7	100
SCG-N1	23	0.00	43.48	12.50	14.41	5	62.5
SCG-N2	22	4.55	22.73	14.77	5.83	8	100
SCG-N3	20	5.00	40.00	14.29	13.36	7	100

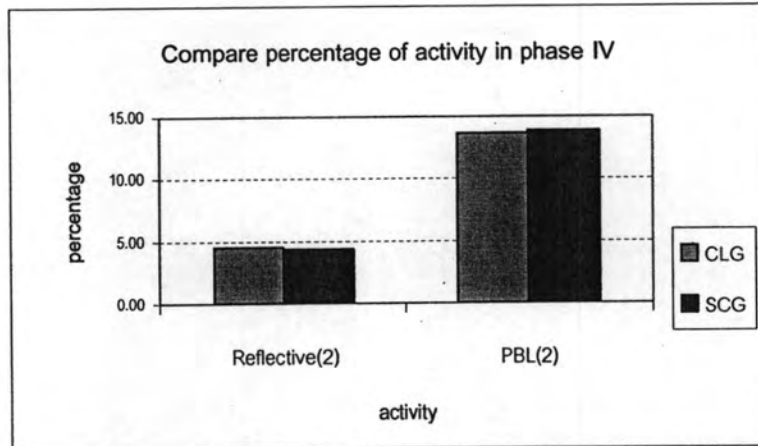


Figure 4.11 Compared activity participation during phase IV

When compared the CLG and SCG about the percentage student posted in each activity, there was no significantly different (Independent T-Test $df. = 43$ $P=0.863, 0.954$ for reflective thought(2) and PBL(2) respectively).

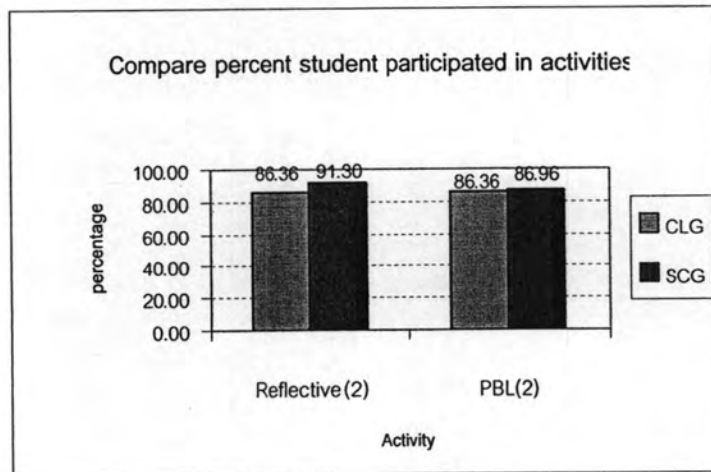


Figure 4.12 Compared percent of students participating during phase IV

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

At the fourth phase, group discussions occurred which were expected to center around the content to solve problems. During phase III, SCG had more time to concentrate in only one unit while CLG had to study three units. The assumption that the students from SCG groups referred their posts to their prior unit of content more than those from CLG groups was analyzed by compare the number of messages referred to the previous content posted during phase IV. The percentage of those messages posted by the students of SCG subgroup who studied only one unit of content were more than others but it was not significantly different as shown in Table 4.38

Table 4.38 Referred unit of content by SCG subgroup compared between others

	N	Mean of percentage individual posted referred to unit II
SCG-1	8	64.27 \pm 35.67
others	37	47.38 \pm 40.16 Independent T test df=43 P=0.278
	N	Mean of percentage individual posted referred to unit III
SCG-2	8	50 \pm 46.29
others	37	33.44 \pm 36.32 Independent T test df=43 P=0.271
	N	Mean of percentage individual posted referred to unit IV
SCG-3	7	53.57 \pm 31.86
others	38	46.13 \pm 36.82 Independent T test df=43 P=0.620

In the same SCG subgroup, there was an analysis to find out if each subgroup member had referred to his/her prior content unit they concentrated in phase III more than other content units. One Way Anova was applied to measure the quantity of the unit content referred by each student. The results showed no significant in content unit students referred. (Table 4.39-4.40)

Table 4.39 Referred unit of content by SCG subgroup compared between SCG

	SCG-1	SCG-2	SCG-3
	Mean±SD	Mean±SD	Mean±SD
Unit II	64.27±35.67	55.21±39.07	41.67±36.32
Unit III	57.40±40.44	50.00±46.29	13.10±16.57
Unit IV	70.21±34.09	36.46±36.71	53.57±31.86

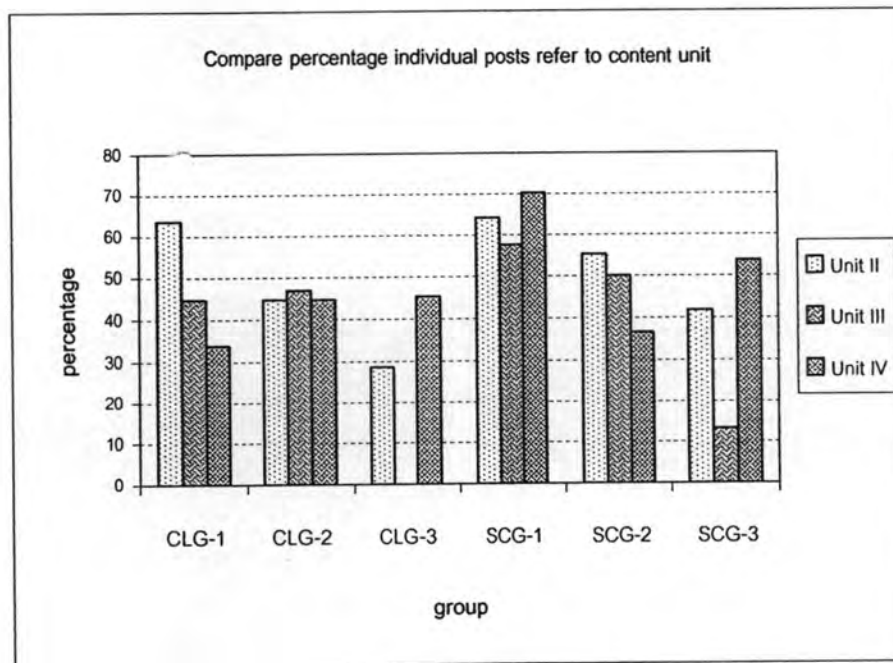


Figure 4.13 Compared individual posts in each subgroup referred to unit content

Table 4.40 Anova test unit of content posted by SCG subgroup

Percentage unit of content posted by SCG subgroups	Source	Sum of Squares	df	Mean Square	F	Sig.
Unit II	Between Groups	1919.06	2	959.53	0.698	0.509
	Within Groups	27507.21	20	1375.36		
	Total	29426.27	22			
Unit III	Between Groups	8246.65	2	4123.33	2.935	0.076
	Within Groups	28093.27	20	1404.66		
	Total	36339.92	22			
Unit IV	Between Groups	4556.53	2	2278.26	1.926	0.172
	Within Groups	23662.80	20	1183.14		
	Total	28219.32	22			

Percentage unit of content posted by SCG subgroups was not different.

4.3 Student perception and satisfaction

4.3.1 Student perception on online learning outcomes

The results revealed that students perceived the overall outcomes of the online community pharmacy course based on the social constructivist theory as 7.23 ± 1.82 (somewhat agree)(median= 7.80, Mode= 8.73). The two groups were not significantly difference in that perception (CLG; 7.29 ± 2.10 vs SCG; 7.18 ± 1.55 $p=0.833$). All perceived statements were shown in Table 4.41

Table 4.41 Student perception on online learning outcomes

	Total		CLG		SCG		P
	Mean	SD	Mean	SD	Mean	SD	(T Test) df=43
Student's perception of knowledge escalated.	7.26	1.49	7.61	1.48	6.92	1.46	0.122
Student's perception of learning skills	7.26	1.92	7.21	2.23	7.30	1.62	0.874
Student's perception of learning process	7.43	1.94	7.47	2.15	7.40	1.76	0.914
Student's perception of learning atmosphere and motivation.	7.05	2.18	7.14	2.41	6.97	1.99	0.805
Student's perception of learning development.	7.28	2.20	7.25	2.46	7.30	1.96	0.935
Student's affection of the interaction online course	7.31	2.25	7.32	2.75	7.30	1.71	0.984
Total perception	7.23	1.82	7.29	2.10	7.18	1.55	0.834

The total of student's perception in all aspects were compared in Table xxx The maximum score perceived by students during the course was in the aspect of learning process (7.43 ± 1.94). The minimum score the students perceived of the course was in the aspect of learning atmosphere and motivation (7.05 ± 2.18) Subsequent to analyzing data as groups, the results was opposite between CLG and SCG. The maximum score in CLG was seen in the aspect of knowledge escalated whereas in SCG that was seen as minimum score. (7.61 ± 1.48 vs. 6.92 ± 1.46 in CLG

and SCG respectively) Student's perception of learning process had the maximum score in SCG but in CLG was not (7.47 ± 2.15 vs. 7.40 ± 1.76 in CLG and SCG respectively).

Table 4.42 Students and mean score of overall perception compared between groups

	Total	CLG	SCG
Overall perception: mean score was equal or less than 5	6	3	3
%	13.33	13.64	13.04
Overall perception: mean score was more than 5 (more than agree to strongly agree 5->10)	39	19	20
%	86.67	86.36	86.96
	45	22	23

The details of all issues related to the student perception and satisfaction were presented in Table 4.43

Table 4.43 Mean score of detail of overall perception compared between groups

		Total		CLG		SCG	
		Mean	SD	Mean	SD	Mean	SD
Student's perception of knowledge escalated.	Amount of knowledge escalated.	7.02	1.64	7.36	1.74	6.70	1.51
	Quality of knowledge that could be applicable in the real life	7.50	1.89	7.86	1.74	7.15	2.00
Student's perception of learning skills	Self directed learning skill	7.71	1.92	7.66	2.34	7.76	1.46
	Cooperative learning skill	6.50	2.21	6.36	2.46	6.63	1.98
	Systematic thinking skill	7.57	2.07	7.61	2.30	7.52	1.87
Student's perception of learning process	Student's own prior knowledge and experience sharing online were accepted to be important for escalating other knowledge.	7.10	2.14	7.20	2.34	7.00	1.97
	Friends' prior knowledge and experience sharing online were accepted to be important for escalating Student's own knowledge.	7.77	1.86	7.73	2.07	7.80	1.67
Student's perception of learning atmosphere and motivation	Online atmosphere encouraged interaction.	7.08	2.28	7.23	2.40	6.93	2.21
	Related community pharmacy problems in the course motivated students to learn	6.89	2.25	7.05	2.42	6.74	2.13
	Diversity and difference between student's knowledge /experience motivated students to learn	7.30	2.34	7.45	2.60	7.15	2.10
	Online facilitator motivated students to learn	6.94	2.35	6.82	2.60	7.07	2.13
Student's perception of learning development.	Student developed autonomous learning process.	7.53	2.18	7.64	2.48	7.43	1.91
	Friends helped students in learning development process.	7.12	2.23	7.16	2.47	7.09	2.02
	Online facilitator helped students in learning development process.	7.18	2.42	6.95	2.66	7.39	2.21
Student's affection of the interaction online course	Student's affection of the interaction online course	7.31	2.25	7.32	2.75	7.30	1.71

4.3.1.1 Student's perception of knowledge escalated.

1. Amount of knowledge escalated.
2. Quality of knowledge that could be applicable in the real life

There were 5 students (11.1%) who did not perceived the knowledge escalated after the course. (2 and 3 students from CLG and SCG respectively) The quality of the knowledge that could be applicable in the real life had more perceived score than the amount of knowledge escalated in all groups.

4.3.1.2 Student's perception of learning skills

- 1 Self directed learning skill
- 2 Cooperative learning skill
- 3 Systematic thinking skill

There were 5 students (11.1%) who did not perceived the course activated learning skills. (3 and 2 students from CLG and SCG respectively) The self-directed skill was gained highest score in all the statement of this aspect (nearly 8 in all groups mean= 7.66 ± 2.34 vs. 7.76 ± 1.46 median=8.25 vs. 8 from CLG and SCG respectively). The least was shown in cooperative learning skill. (6.36 ± 2.46 vs. 6.63 ± 1.98 median=6.75 vs. 7).

4.3.1.3 Student's perception of learning process

1. Student's own prior knowledge and experience sharing online was accepted to be important for escalating other knowledge.
2. Friends' prior knowledge and experience sharing online was accepted to be important for escalating Student's own knowledge.

There were 6 students (13.3%) who did not perceived the sharing among themselves and others were important (3 and 3 students from CLG and SCG respectively). There were 16 students (35.6% 8 and 8 students from CLG and SCG respectively) who agree that their prior knowledge and experience sharing online were as important as those of friends. The majority of the students 57.8% (26 students; 12 vs. 14 from CLG and SCG respectively) agreed that friends' prior knowledge and experience sharing online were more important than their own knowledge and experience.

4.3.1.4 Student's perception of learning atmosphere and motivation.

1. Online atmosphere encouraged interaction.
2. Related community pharmacy problems in the course motivated students to learn
3. Diversity and difference between student's knowledge /experience motivated students to learn
4. Online facilitator motivated students to learn

There were 5 students (11.1%) who did not perceived the course encouraged learning atmosphere and motivation. (Three and two students from CLG and SCG respectively). The item which students perceived to have the highest score in learning atmosphere and motivation was the diversity and difference between student's knowledge /experience motivated students to learn. (7.30 ± 2.34 median 7.5 mode 9; 7.45 ± 2.60 median 8 mode 9 vs. 7.15 ± 2.10 median 7 mode 7 for total ,CLG and SCG respectively) The least score in this aspect of CLG was online facilitator motivated students to learn while of the SCG was that related community pharmacy problems in the course motivated students to learn. (6.82 ± 2.60 , median =7.75 vs. 6.74 ± 2.13 , median 7 respectively).

4.3.1.5 Student's perception of learning development.

1. Student developed autonomous learning process.
2. Friends helped students in learning development process.
3. Online facilitator helped students in learning development process.

In this aspect, there were 7 students (15.6%) who did not perceived the course encouraged learning development (4 and 3 students from CLG and SCG respectively). The highest score in this aspect was student developed autonomous learning process. (7.53 ± 2.18 median = 8, 7.64 ± 2.48 median = 8.5 and 7.43 ± 1.91 median = 8 for total of CLG and SCG respectively) The least score for encouraging learning development of CLG was that online facilitator helped students in learning development process, on the contrary of SCG was that friends helped students in learning development process. (6.95 ± 2.66 median 8 and 7.09 ± 2.02 median 7 respectively)

4.3.1.6 Student's perception of the online course effectiveness.

The online strategy that was more effectiveness

Table 4.44 Student perception of the online course effectiveness compared between groups

Issues/Comment from	CLG	SCG	Total
CLG more effective	13	9	22
	59.09	39.13	48.89
SCG more effective	3	8	11
	13.64	34.78	24.44
CLG equaled to SCG	5	4	9
	22.73	17.39	20.00
No response	1	2	3
	4.55	8.70	6.67
Total	22	23	45
	100	100	100

Nearly 50 percent (48.89%) of the class perceived that the CLG was more effective than SCG, whereas 11 students (24.44 %) perceived that SCG was more effective than CLG. Nine students perceived that the effectiveness of the two groups were the same. There were 3 students who did not responded to this statement. When analyze the data with chi-square to see relationship between groups of students who perceived either CLG or SCG to be more effective, the result showed that there was no significant relationship between groups of students and the strategy they perceived to be more effective. (Pearson Chi-square $df=2; P= 0.211$).

4.3.1.7 Student's affection of the interaction of the online course

There were 6 students (13.3%) who did not like the interaction of online course. (4 and 2 students from CLG and SCG respectively). The average score of student's affection on the interaction of the online course is nearly the same between those two groups (7.32 ± 2.75 vs. 7.30 ± 1.71 , CLG and SCG respectively).

4.3.2 Student satisfaction with online learning activities

Table 4.45 Student satisfaction of the online activities

	Total		CLG		SCG		P
	Mean	SD	Mean	SD	Mean	SD	T Test df=43
Online interaction	3.63	0.75	3.67	0.79	3.59	0.72	0.749
Exploring drugstore	3.74	0.73	3.80	0.72	3.70	0.76	0.654
Reflective Thought	3.77	0.92	3.70	1.11	3.83	0.72	0.663
Concept mapping	3.79	0.82	3.67	0.82	3.90	0.83	0.352
Ask facilitator forum posting	3.80	0.98	3.57	1.00	4.02	0.93	0.122
Think aloud	3.81	0.91	3.60	1.00	4.00	0.78	0.144
Related resources reading	3.91	0.73	4.07	0.76	3.76	0.68	0.160
Documents received	4.01	0.70	4.05	0.58	3.98	0.82	0.753
Pre-Post test	4.07	0.68	3.98	0.65	4.15	0.71	0.393

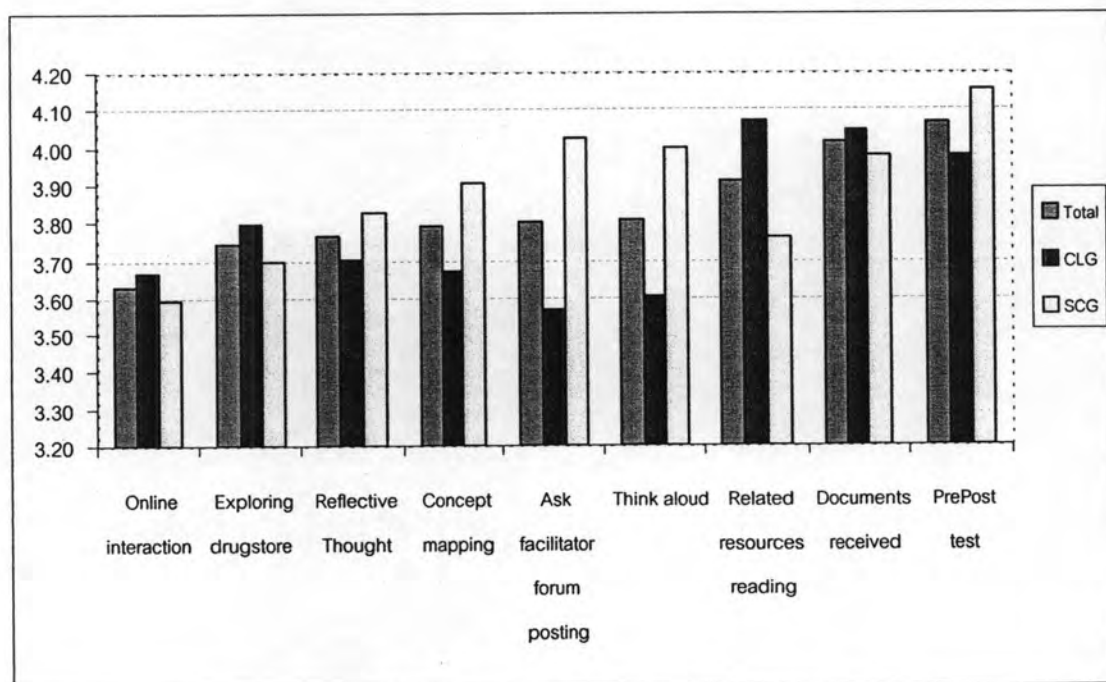


Figure 4.14 Student satisfaction of the online activities

As shown in Figure 4.15, satisfaction score of all students showed that students satisfied with individual activities more than interaction activities. The least score of satisfaction was from online interaction activities. CLG students satisfied most with reading related resources and less with asking in facilitator forum. SCG students satisfied most with Pre-post test and less with online interaction activities. After Independent T Test was applied, the results revealed that the satisfaction score of CLG and SCG in all activities were not different. (Table 4.45)

Table 4.46 Student agreement on online course implementation

	Total		CLG		SCG		P
	Mean	SD	Mean	SD.	Mean	SD	T-Test df=43
Appropriate for online course; web-structure and interface	3.91	1.06	3.91	1.19	3.91	0.95	0.990
Appropriate for font and image in this online course	4.02	0.84	3.95	0.84	4.09	0.85	0.602
Appropriate for convenient online learning	3.22	1.06	3.05	1.13	3.39	0.99	0.281
Appropriate for continue online community pharmacy course	3.89	1.07	3.91	1.11	3.87	1.06	0.903
Total appropriation for implemented online pharmacy community course.	3.76	0.81	3.70	0.90	3.82	0.74	0.654

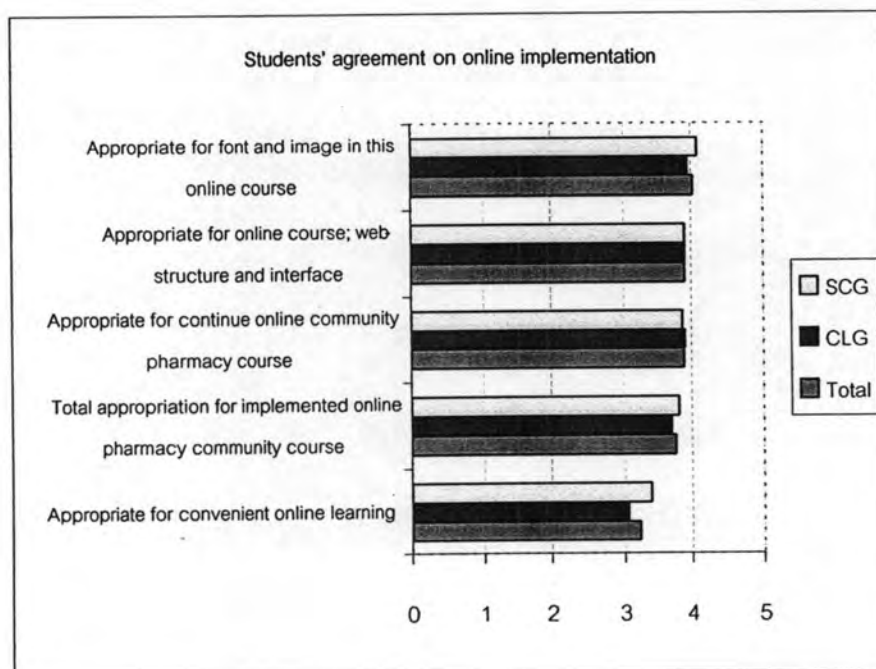


Figure 4.15 Student agreement on online course implementation

From Figure 4.15 and Table 4.46, the agreement score was the least in the item of appropriate for convenient online learning and the highest was in the item of appropriate for font and image, regardless of groups.

Students gave their reasons for their perceptions of inconvenient online learning in the open-end questionnaire (overall evaluation) as shown in Table 4.47

Table 4.47 Reasons for students perception of inconvenient online learning

	Number of students accepted	Percentage of total student
The web pages were inconvenient to explore, especially for assignment commands. They could not be easily recognized. Untidy links	20	44.44
Too many tasks and activities	15	33.33
Inaccessible to the web pages	14	31.11
Less time for doing assignment, inappropriate periods for online activities	13	28.89
Less participation from friends	13	28.89
Negative attitude to online learning	11	24.44
Have no personal computer	5	11.11
Some of facilitator guides or commands were not understandable	4	8.89
Lack of technical skills.	4	8.89
Too many contents provided.	3	6.67
Too flexible and compassionate of the course/facilitator	2	4.44
Some of discussion issues were not interesting.	1	2.22
	N= 41	91.11

There were 4 students who did not give any reason for inconvenience. (8.89%). The others gave at least one reasons for that. From Table 4.34 the most inconvenience pointed to the designed of the web pages. The web pages were inconvenient to explore, especially for assignment commands. They could not be easily recognized. Untidy links. Students wanted the web course to be more simplified. Obviously, 2 students (4.44%) mentioned about the course/ facilitator was too flexible and compassionate that made some students did not participate.

Evidence supported student perception and satisfaction to the online community pharmacy course

Many students felt **positive** with the online course, they notified in their evaluation paper as example;

CLG#1 We know that knowledge is not limited to the documents only. We are stimulated to learn from the real world. The course provided me the chance to see various ideas. If I had not enrolled to the course, I would have not known my friends thoughts. There was diversity and could provide me valuable lesson.

CLG#2 This online learning course is the starting point for thinking. It provide us a freedom to share.

CLG#3 Personally, I like to study online. It provided freedom to study. If I have time, I can study. However to access in this online course was not as much as it should be. Consequently we did not learn much. The course should have been stricter.

CLG#25 I think this online learning is quite good. It help us to understand our thought and others. I get some experiences by sharing stories with my friends. Moreover, I can get community pharmacy management knowledge. However, I want to suggest that instructor should sum up all contents at the end of the course, then we can share and make the information more applicable, Thanks

SCG#21 I learnt how to learn and work in team. Giving collaboration to team will bring success. One cannot success alone. I want the online course to continue since the way we exchanged with others, we got various ideas or experience those we did not expect before. It gave us a chance to see how community pharmacy management and business worked.

SCG#28 The online course was enjoyable. I do like it. I have not studied in this style before. It gave me various issues and opened up my thoughts.

SCG#29 I am more courageous to share my own ideas with friends

SCG#40 This is a good course. It made me responsible for my studying. My systematic thought and teamwork collaboration were practiced.

SCG#43 This online course is the novel concept, I have not learnt before. I was curious to study in the real world outside the classroom. It stimulated my thought, I got the answers for many questions such as why it occurred liked that or if the management issues in the classroom was practical.

Contrarily, there were some **negative** sides, with some suggestions

CLG#9 The content was too much. At first I can read, but later I was too exhausted to read all

CLG#12 When I had a question I felt inconvenient to ask instructor. Since I want to get immediately reply. After I posted my question, I have to wait and access to the net again. That made my curiosity in that question lost.

CLG#22 I don't like the premise that students should log in the web at least 4 hours per week, since I spent more than 4 hours to read and thought without accessing the net.

CLG#45 In my opinion, the community pharmacy content is really interesting, and online instruction will increases its role to our life. It is great to have a chance to understand online learning system. In practical, I know that no computer and no internet accessible of my own were very important obstacles. In my routine life, I paid a whole day on traditional study, doing reports or assignments. When I went to the dormitory, it was too late. I have no facility to access to the online course. The convenience of facilities had an effect on my learning activities. I had to go to the computer lab just only to finish my online assignment. I ignored some relevant contents. I am sorry for that loss.

SCG#7 If this semester we did not have so much subjects or tasks like this, this online course should be more beneficial for us since we would have had more time to share and exchange our ideas.

SCG#42 To study online course should not let student who did not have any facility to access the internet. It was so distressingly studying.

Students learnt many things not only the community pharmacy content,
they wrote as example,

SCG#17 I learnt how to manage myself . The online course provide my own responsibility to learn, it was different from the classroom. In classroom we always have instructor to stimulate us to learn.

SCG#31 I learnt how to understand my friends and to share with them

SCG#41 I learnt online communication skills

CLG#24 I learnt a lot more after finished this online course, but we had to take a long time to study.

CLG#35 This course tried to highlight us to have a systematic thought, such as reflective thought activity, concept mapping activity. For concept map, it provided us to summarized all the information we learnt (in fact I used to draw my concept map after I finished my reading because it helped me to stress what I had to know, what is the construct in each subject) When seeing concept map I can remind what I have learnt, and what is the detail in there.

CLG#2 To practice conceptual thinking was very beneficial. All of our learning subjects should have been summed up to draw concept map.

Many students **complaint about the time consume task**, concept mapping as example,

CLG#16 It took a long time to construct concept map since we have to read summarize then draw it, but it was our note to present the relationship of each unit.

CLG#32 I cannot draw concept map. It took me a lot of time. Yes, it is good to sum up all the information I read but I cannot express it to be a construct in a concept map. It was really hard.

SCG#13 At first, I don't like doing concept map since powerpoint had drawn it. It was too hard and took time. After I can draw it manually, it was better. If the concept map had not been assigned, I would not have paid any attention to the readings. The way I can resend my previous concept map was nice because no more constructs would be added.

SCG#18 Concept map should be done by group since I am not sure for the process I construct my own alone.

SCG#42 It took a long time, I am not keen in using any program then my concept map was not as complete as I expected. I really wanted to add some more construct, but I did not have ability to.

After observing more about **student who did not participate the online class, the results of his comment in the evaluation form revealed what was behind the scene. As follows.**

CLG#30 Before comment anything, I have to say I am sorry, I did not join much in an online activity. I am so busy and sometime I omitted to study. I still cannot find the time to join now because I have an examination. In my opinion, this course was really good, and should be continued since in our faculty we had very few course like this. Majority of the pharmacy courses have been taught us as for recitation. However, there were too many tasks in this course. My opinion, I want to have an easy and classified structure of web interface (I had gotten lost when I was surfing the net studying this online course) If possible, individual activities should be reduced and the interaction activities should be increased. In summary, as a whole I like this course and want to see the continual one.

SCG#14 Dear PK. (nickname of facilitator),
With respect, I want to give 3 issues of suggestions

1 The readiness of both the facilities and students. I think it would have been perfect if the online course had been established 2 years later. Up to date the server is not ready. Students cannot access to the course regularly. It is not convenient at all. Sometimes the server was down. The time the server worked and the time student available to learn did not match. Then the concept to access to the course from anywhere anytime was not true. It was difficult and hard to access. It made the course boring, and another problem occurred, student disappeared from the class.

2 I think there should be a schedule to make a face to face meeting with facilitator once a week. To make an agreement what will go on. To leave all responsibilities to students themselves made some students cannot follow according to their abilities. Those students would be bored and finally completely ignorant about studying.

3. The learning website, in overview it is good but my suggestion is to add more for convenient features for contacting others, summary assignment menu. Students can check what they have or have not done by themselves. In this online course the web did not provide easy features for those.