CHAPTER 4

Research Results

The results of strategies development to enhance critical thinking for nursing students are presented by objectives as followed.

Phase 1 The exploration of the current situation and expectation on critical thinking enhancement for nursing students in state institutes. This includes 3 parts.

Part 1.1 Demographic Characteristics.

Part 1.2 The difference among expectation on critical thinking enhancement strategies and current situation.

Part 1.3 The results of study on current situation, exepectation and needs assessment on critical thinking enhancement strategies.

Phase 2 The construction and development of the critical thinking enhancement strategy for nursing students in state institutes. This includes 3 parts.

Part 2.1 Synthesis of strategy on critical thinking enhancement for nursing students.

Part 2.2 Experts' opinions on tentative critical thinking enhancement strategies and conclusion on critical thinking enhancement strategies.

Part 2.3 Selection of strategy for implementation and evaluation.

Phase 3 The implementing results on selected critical thinking enhancement strategy for nursing students in state institutes. This includes 2 parts.

Part 3.1 The results of implementation of the selected strategy.

Part 3.2 Conclusion on critical thinking enhancement strategy for nursing students in state institutes.

Phase 1 The exploration of the current situation and expectation on critical thinking enhancement for nursing students in state institutes.

This phase was to study samples' opinions on critical thinking enhancement. Samples consisted of academic administrators, instructors and nursing students.

Part 1.1 Demographic Characteristics.

Table 4.1 Demographic Characteristics of Instructors.

Characteristics	Total	Percentage
Gender		
male	2	0.91
Female	218	99.09
Age (years)		
< 30	44	20.00
31 - 40	53	24.09
41 – 50	69	31.36
> 50	54	24.55
Education		
Masters in Nursing	114	51.82
Ph.D. in Nursing. or Doctor of Nuring	106	48.18
Department		
Maternity Nursing and Miswifery	41	18.64
Pediatric Nursing	32	14.55
Adult and Elderly Nursing	42	19.09
Community Nursing	34	15.45
Psychiatric Nursing	38	17.27
Fundamental Nursing and Administration	33	15.00

From Table 4.1: most of samples were female (99.0%), age ranged from 41 to 50 years (31.6%), earned master's degree in nursing (51.82 %) and worked in adult and elderly nursing (19.09%).

Table 4.2 Demographic Characteristics of Nursing Students.

Characteristics	Total	Percentage
Gender		
male	34	9.58
Female	321	90.42
Age (years)		
18 – 20	46	13.80
21 – 23	287	81.97
> 23	11	4.23
Student status		
Third year	161	47.04
Fourth year	183	52.96

Fron Table 4.2: most of samples were female (90.42%), age ranged from 21 to 23 years (81.9%), were the fourth year students (52.96%).

Part 1.2 The difference among expectation on critical thinking enhancement
strategies and current situation.

The difference of opinion on current situation and expectation on critical thinking enhancement of nursing students were analyzed by dependent *t* test. The details were as followed.

Table 4.3 Difference between expectation and current situation of academic administrations' behaviors in critical thinking enhancement of nursing students: instructors'opinion.

No	Behaviors	mean		*t*	p value
		expectation	current situation		
1.	stipulate instructional policy on student-centered	4.71	4.18	4.059	.000
2.	promote instruction for critical thinking enhancement	4.66	3.23	12.453	.000
3.	provide resources related to instructional design to enhance critical thinking	4.64	4.14	4.296	.000
4.	assign instructor to participate in policy setting on instructional design focused on student-centered	4.59	3.02	11.399	.000
5.	provide instructor training to understand principle of instructional design focused on student-centered	4.68	2.93	15.770	.000
6.	promote instructor's positive attitude on critical thinking enhancement	4.71	3.32	11.199	.000
7.	promote instructors to design instruction focused on student-centered	4.66	3.25	10.749	.000

Table 4.3 (continued)

No	Behaviors	mean		t	p value
		expectation	current situation		
8.	augment instructor to do lesson plan for knowledge sharing focused on critical thinking	4.57	3.18	9.668	.000
9.	stipulate participation to set goal to enhance critical thinking for student	4.59	3.30	9.419	.000
10.	provide meeting for sharing and solving problem and obstacle in instructional design for critical thinking enhancement	4.57	2.93	10.640	.000
11.	support and facilitate material for instructional design for critical thinking enhancement	4.59	4.05	4.678	.000
12.	promote and encourage instructor to design instruction for critical thinking enhancement	4.57	3.04	10.519	.000
13.	allocate material and media for instruction design for critical thinking enhancement	4.66	3.95	6.018	.000
14.	promote instructor's capacity development on instructional design for critical thinking enhancement	4.61	3.38	8.032	.000
15.	monitor, supervise and encourages teachers and students to perform on enhancing critical thinking	4.77	3.21	9.675	.000
16.	manage and support instructional design to enhance critical thinking	4.52	2.80	12.003	.000

From Table 4.3: Instructors'opinion on expectation and current situation of all academic administrations' behaviors in critical thinking enhancement of nursing students were statistically significantly different. The greatest difference were 'provide

instructor training to understand principle of instructional design focused on student-centered' ($t = 15.770$, p=.000) followed by 'promote instructional design for critical thinking enhancement' ($t = 12.453$, p =.000) and 'manage and support instructional design to enhance critical thinking' ($t = 12.003$, p =.000).

Table 4.4 Difference between expectation and current situation of
instructors' role in critical thinking enhancement of
nursing students: instructors' opinion.

No	Behaviors	mean		t	p value
		expectation	current situation		
1.	set goals and cooperate for instructional design by integrating knowledge to enhance critical thinking.	4.66	3.25	10.188	.000
2.	determine the activity of instructional design consistent and appropriate for student.	4.70	3.32	10.192	.000
3.	set helpful activities for critical thinking enhancement.	4.70	3.38	9.550	.000
4.	provide opportunities for student to participate in instruction.	4.66	3.14	9.968	.000
5.	provide various resources for student to serach and self-learning	4.61	4.00	5.371	.000

From Table 4.4: Instructors' opinion on expectation and current situation of all
instructors' behaviors in critical thinking enhancement of nursing students were
statistically significantly different. The greatest difference was 'determine the activity of
instructional design consistent and appropriate for student' ($t = 10.192$, p =.000) and the
least difference was 'provide various resources for student to serach and self-learning'
($t = 5.371$, p =.000).

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Table 4.5 Difference between expectation and current situation of
instructional design in critical thinking enhancement of
nursing students:instructors' opinion.

No	Behaviors	mean		t	p value
		expectation	current situation		
1.	provide learning activities for students able to use their own potential as an individual characteristic.	4.68	4.11	4.804	.000
2.	design flexible instruction, adjust strategies appropriately for situation and students	4.61	4.12	3.968	.000
3.	encourages students to continually search.	4.73	4.20	4.834	.000
4.	create provocative atmosphere, challenging, and encouraging students with the ambiguous issue.	4.71	4.18	4.401	.000
5.	create freely atmosphere and feel safety for students to express their opinions during instruction.	4.39	2.80	8.725	.000
6.	guide students to search the knowledge from diverse resources	4.71	3.88	6.487	.000
7.	design and plan for diverse and appropriate instruction design for students to enhance critical thinking.	4.71	3.04	9.855	.000
8.	provide opportunity for students to reflect on their learning process.	4.73	4.20	4.834	.000
9.	provide feedback to students with straightforwardness.	4.68	4.18	4.072	.000
10.	provide opportunities for students to participate in the evaluation learning outcome.	4.75	4.38	3.226	.002

Table 4.5 (continued)

No	Behaviors	mean		t	p value
		expectation	current situation		
11.	assess the situation during the course for developing students continuously.	4.79	4.18	5.809	.000
12.	prepare students for instructional design focused on student-centered	4.70	2.88	13.277	.000
13.	provide instructional design appropriately to the interests and aptitudes of the students under the concept of individual differences.	4.61	2.93	10.476	.000
14.	focus on the students to enhance enthusiasm and searcher.	4.79	4.20	5.431	.000
15.	provide opportunities for students to participate in instructional design.	4.73	2.86	13.024	.000
16.	use critical questions for students to build on their knowledge and learn continuously.	4.64	2.80	11.580	.000
17.	assign the students to search and share their knowledge	4.66	2.95	10.677	.000

From Table 4.5: Instructors' opinion on expectation and current situation of instructional design in critical thinking enhancement of nursing students were all statistically significantly different. The greatest difference were 'prepare students for instructional design focused on student-centered' ($t = 13.277$, p =.000) followed by 'provide opportunities for students to participate in instructional design' ($t = 13.024$, p =.000) and 'use critical questions for students to build on their knowledge and learn continuously' ($t = 11.580$, p =.000). The least difference was 'provide opportunities for students to participate in the evaluation learning outcome' ($t = 3.226$, p =.000).

Table 4.6 Difference between expectation and current situation of academic administrators' role in critical thinking enhancement of nursing students: students' opinion.

No	Behaviors	mean		t	p value
		expectation	current situation		
1.	announce instructional design focused on student-centered policy in the institute.	4.46	4.16	5.731	.000
2.	provide diverse resources for students to search.	4.58	4.05	9.726	.000
3.	supply computer sufficient as students' needs.	4.59	3.63	15.178	.000
4.	provide wifi or LAN conducive to access for searching in the institute thoroughly.	4.74	4.07	12.916	.000
5.	support budget for activities to enhance self-learning.	4.50	3.34	17.418	.000

From Table 4.6: Students' opinion in expectation and current situation of all academic administrators' role in critical thinking enhancement of nursing students were statistically significantly different. The greatest difference was 'supprot budget for activities to enhance self-learning'. ($t = 17.418$, p =.000). The least difference was 'announce on instructional design focused on student-centered policy in the institute' ($t = 5.731$, p =.000).

Table 4.7 Difference between expectation and current situation of instructors' role in
critical thinking enhancement of nursing students:
students' opinion.

| No | Behaviors | mean | | t | p value |
		expectation	current situation		
1.	provide diverse instructional design	4.53	3.16	22.847	.000
2.	use medias to enhance understanding more easily.	4.57	4.04	9.931	.000
3.	provide activities stimularious students to make various thoughts	4.48	3.37	21.215	.000
4.	design instruction focused on enthusiasm and interesting to search knowledge.	4.46	3.40	19.911	.000
5.	provide instructional design appropriate to the interest of students.	4.52	3.30	21.827	.000
6.	comply flexibility during instruction.	4.51	3.87	11.294	.000
7.	promote students' learning with their own potentiality.	4.49	3.95	9.379	.000
8.	encourage and provide opportunities for students to analyze various alternation	4.46	3.35	20.074	.000
9.	encourage students to learn systematically	4.49	4.17	6.119	.000
10.	create ambiguous issue to encourage students to additional searching	4.18	4.15	.459	.647
11.	use question to encourage student to think analytically	4.38	4.12	4.461	.000
12.	teach student to able to think analytically	4.46	4.16	5.181	.000
13.	encourage skills to understand problem.	4.47	4.15	6.065	.000

Table 4.7 (continued)

No	Behaviors	mean		t	p value
		expectation	current situation		
14.	provide time to think analytically to answer question on their own	4.42	3.91	8.843	.000
15.	encourage and provide opportunities for students to show reasons with their opinion	4.44	4.05	6.964	.000
16.	train students to work and think within tin small groups	4.31	3.96	5.817	.000
17.	assign students to search for additional knowledge	4.28	4.02	4.208	.000
18.	encourage students to search from diverse resources	4.44	4.00	7.507	.000
19.	provide opportunity for students to show their opinion freely	4.50	3.39	20.020	.000
20.	adjust instructors' manner for making students feel free to comment	4.52	3.53	16.809	.000
21.	encourage students to use process of summarize theoretical concept to describe issues (deductive)	4.35	3.90	7.955	.000
22.	encourage students to use process of conclusion of the minor issues to describe eyeview issue (inductive)	4.38	3.40	17.796	.000
23.	provide opportunities for students to enter concept by self-learning	4.37	3.97	6.933	.000
24.	provide opportunity for students to participate in the evaluation of instruction	4.48	4.12	5.655	.000
25.	provide opportunity for students to reflect on their self-learning process	4.44	4.03	6.777	.000

Table 4.7 (continued)

No	Behaviors	mean		*t*	p value
		expectation	current situation		
26.	feedback for students' learning with straightforwardness	4.49	3.92	9.622	.000

From Table 4.7: Students' opinion in expectation and current situation of most of instructors' role in critical thinking enhancement of nursing students were statistically significantly different except that of 'create ambiguous issue to encourage students to additional searching'($t = .459$, p $=.647$). The greatest difference were 'provide diverse instructional design' ($t = 22.847$, p $=.000$) followed by 'provide instructional design appropriate to the interest of students ($t = 21.827$, p $=.000$) and 'encourage and provide opportunities for students to analyze various alternation' ($t = 20.074$, p $=.000$). The least difference was 'assign students to search for additional knowledge' ($t = 4.208$, p $=.000$).

Table 4.8 Difference between expectation and current situation of students' role in critical thinking enhancement of nursing students: students' opinion.

No	Behaviors	mean		t	p value
		expectation	current situation		
1.	determine instructional design with instructor	4.39	3.47	15.077	.000
2.	answer challenging question clearly	4.35	3.32	18.281	.000
3.	anlayze reliability of data rationally and clearly	4.42	3.40	19.357	.000
4.	find arguments for ambiguous or unclear information	4.44	3.40	18.298	.000
5.	link related information	4.42	3.59	16.056	.000
6.	conclude solution to approach for solving problem	4.47	3.62	15.862	.000
7.	feel free to discuss during instruction	4.48	3.61	16.070	.000
8.	share information with instructors and colleagues	4.43	3.59	14.521	.000
9.	find and analyze problem in their own way	4.47	3.86	10.707	.000
10.	solve problem by themselves during learning	4.48	3.86	10.953	.000
11.	work systematically involving learning	4.47	3.94	9.236	.000
12.	make decision to do anything with enough rational or evidence	4.49	3.96	9.731	.000
13.	reflect self-learning process with straightforwardness	4.53	3.96	11.012	.000
14.	develop learning process after instructor's feedback	4.54	3.98	10.411	.000
15.	use process of summarize theoretical concept to describe issues (deductive)	4.45	3.87	10.067	.000

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Table 4.8 (continued)

| No | Behaviors | mean | | t | p value |
		expectation	current situation		
16.	use process of conclusion of the minor issues to describe eyeview issue (inductive)	4.49	3.52	17.643	.000

From Table 4.8: Students' opinion in expectation and current situation of all students' role on critical thinking enhancement of nursing students were statistically significantly different. The greatest difference were 'anlayze reliability of data rationally and clearly' ($t = 19.357$, p =.000) followed by 'find arguments for ambiguous or unclear information'($t = 18.298$, p =.000) and 'answer challenging question clearly'($t = 18.281$, p ~~value~~ =.000). The least difference was 'work systematically involving learning' ($t = 9.236$, p =.000) and 'make decision to do anything with enough rational or evidence' ($t = 9.731$, p =.000).

Part 1.3 Conclusion of the study results of current situation and expectation on critical thinking enhancement for nursing students.

After researcher analyzed subjects'opinion who were academic administrators, instructors and nursing students. The results could be concluded in 2 issues as followed:

Issue 1: Opinion on current situation to enhance critical thinking for nursing students

Researcher analyzed subjects'opinion by arithmetic mean, items with arithmetic mean $\geq$ 3.50 were selected and organized into categories as presented in table 4.9.

Table 4.9 Conclusion of the study results of current situation and expectation on critical thinking enhancement for nursing students.

No	Issues needed to enhance critical thinking for nursing students

Academic Administrators' role

1. announce instrcutional design focused on student-centered policy in the institute.
2. provide various resources for student to serach and self-learning.
3. supply adequate numbers of computer as students' needs.
4. provide wifi or LAN conducive to access for searching in the institute thoroughly.
5. support budget for activities to enhance self-learning.

Instructors' role

1. well prepared for instrcutional design.
2. provide diverse instrcutional design.
3. use medias to enhance understanding more easily.
4. provide activities that stimulate students to think.
5. design instruction focused on enthusiasm and interesting to search knowledge.
6. provide instructional design appropriate to the interest of students.
7. comply flexibility during instrcutional design.
8. promote students' learning with their own capability.

Table 4.9 (continued)

No	Issues needed to enhance critical thinking for nursing students
9.	encourage and provide opportunities for students to analyze various alternation.
10.	encourage students to learn systematically.
11.	create ambiguous issue to encourage students for additional searching.
12.	use question to encourage student to think analytically.
13.	teach student to think analytically.
14.	increase skills to understand problem.
15.	provide adequate time to think analytically to find answer on their own.
16.	encourage and provide opportunities for students to give reasons to illustrate their opinion.
17.	train students to work and think within small groups.
18.	assign students to search for additional knowledge.
19.	encourage students to search from diverse resources.
20.	provide opportunity for students to show their opiniont freely.
21.	adjust instructors' manner to make students feel free to comment.
22.	encourage students to use process of summarize theoretical concept to describe issues (deductive).
23.	encourage students to use process of conclusion of the minor issues to describe eyeview issue (inductive).
24.	provide opportunities for students to summarize concept by self-learning.
25.	provide opportunity for students to participate in the evaluation of instruction.
26.	provide opportunity for students to reflect on their self-learning process.
27.	feedback students' learning with straightforwardness.

Students' role

1.	determine instructional design with instructor.
2.	answer question clearly.
3.	anlayze reliability of data rationally and clearly.
4.	find arguments for ambiguous or unclear information.
5.	link related information.

Table 4.9 (continued)

No	Issues needed to enhance critical thinking for nursing students
6.	conclude solution to approach for solving problem.
7.	feel free to discuss during instruction.
8.	share information with instructors and colleagues.
9.	find and analyze problem by their own way.
10.	solve problem during learning
11.	work systematically involving learning.
12.	make decision to do anything with enough rational or evidence.
13.	reflect self-learning process with straightforward.
14.	develop learning process after instructor's feedback.
15.	use process of summarize theoretical concept to describe issues (deductive).
16.	use process of conclusion of the minor issues to describe eyeview issue (inductive).

From Table 4.9: The study results of current situation and expectation on critical thinking enhancement for nursing student could be concluded that academic administrators'role consisted of 5 items, instructors'role consisted of 27 items and students' role consisted of 16 items.

Issue 2 Analysis of needs assessment and SWOT analysis for developing strategies to enhance the critical thinking of nursing students.

From subjects'opinion it was found that strategies or methods or role of critical thinking enhancement needed to be developed. Although academic administrators, instructors and nursing students demonstrated some behaviors regarding critical thinking enhancement, subjects perceived that some behaviors were problematic at moderate to high level. Expectations for those behaviours to be occurred were higher than that of current situation. It can be concluded that

1. **Promotion of instrcutional design to enhance critical thinking**: subjects who were instructors needed to train to understand principle of instructional design focused on student-centered, promote attitude of instructor on critical thinking enhancement substantially, provide meeting for knowledge sharing and find solutions for correcting problems in instructional design for critical thinking enhancement, support by promoting the morale and encouragement for instructors to design instruction enhance critical thinking and design instruction focused on student-centered. The methods may include encourage them to do lesson plan that focus on enhancing critical thinking. Moreover, it should include instructional design management focused on critical thinking enhancement. Subjects who were students needed to be supplied by adequate number of computers and provide budget for activities to enhance self-learning.

2. **Behaviors for augmentation of competency of instructors in critical thinking**: subjects who were instructors had opinions that it should be set goals and cooperate for instructional design by integrating knowledge to enhance critical thinking, provide activity of instructional design consistent and appropriate for student, provide diverse instructional design, has capacity to provide activities to stimulate students' thoughts and design instruction focus on enthusiasm and interest to search knowledge, provide opportunities for students to participate in instructional design. Setting helpful activitities for critical thinking enhancement should be done by encouragement and providence of opportunity for students to analyze variously and able to discuss with feeling of safety. During instructional design, instructors should

encourage students to use process of conclusion of the minor issues to describe eyeview issue (inductive), use question to encourage student to think analytically, set ambiguous data to encourage student to thinking analytically and discuss, included assignment for searching and sharing.

Conclusion: As current situation, behaviors which were elements of critical thinking enhancement in roles of academic administrators, instructors, students and instructional design have been demonstrated. However, as subjects' opinion, expectation for critical thinking enhancement was higher than that of in the current situation. Thus, it is appropriate to develop strategy to enhance critical thinking for nursing students.

Phase 2   The construction and development of the critical thinking enhancement strategy for nursing students in state institutes.

Part 2.1 Synthesis of strategy on critical thinking enhancement for nursing students.

Researcher collected items with arithmetic mean ≥ 3.50 to draft strategy on critical thinking for nursing students. All items were categorized into 4 issues 1) academic administrations'role; 2) instructors'role; 3) instructional design; 4) students'role. Futher steps were performed as followed:

1. Focus group with sixteen instructors for nursing students was conducted. The issues for discussion were 1) vision, mission, goals, strategies issues, strategies, plannings/projects, indicators and measure and criteria for evaluation; 2) SWOT analysis for critical thinking enhancement for nursing students.

2. The importance of items in each catagories were evaluated by rating scale. Items with arithmetic mean ≥ 3.50 were selected to be analyzed. SWOT analysis was done to examine strength, weakness, opportunity and threat for critical thinking enhancement for nursing students.

3. The importance of strength, weakness, opportunity and threat was explored by weight scores. Weight score of strength and weakness were 1, as well as opportunity and threat.

4. Researcher multiplied weight score of items in each strength, weakness, opportunity and threat with arithmetic mean of subjects' opinion to calculate real score.

5. Researcher ordered real score for each aspect from the highest to the lowest score.

6. Total scores from SWOT analysis were analyzed by TOWS matrix technique (Wheelen & Hunger, 2006). The scores were as followed:

    strength = 2.19   weakness = 1.53
    opportunity = 1.61   threat = 2.34

7. Regarding SWOT analysis, strategies of critical thinking enhancement for nursing students should be emphasized on promoting existing strengths and driving threat adjustment.

8. Drafting of the preliminary strategies for critical thinking enhancement was done by researcher and subjects.

The results of SWOT were as followed:

Table 4.10 Weighted scores for internal environmental factors: critical thinking enhancement for nursing students.

internal environmental factors	strength /weakness	weight	mean	real score	order
1. To stipulate and promote instructional policy on student-centered obviously.	strength	0.077	4.18	0.322	1
2. To provide variuos related resources for instructional design for critical thinking enhancement.	strength	0.031	4.16	0.129	10
3. To provide contributing things for searching from variuos resources.	strength	0.028	4.07	0.114	11
4. To support and facilitate materials, instruments and medias for instructional design for critical thinking enhancement.	strength	0.003	3.95	0.012	13
5. To adjust strategies and learning activilties for students using their potential under the concept of individual difference.	strength	0.046	4.11	0.189	3.5
7. To use technique to stimulate students for searching continually.	strength	0.049	4.20	0.206	7
8. To encourage and provide opportunities for students to discuss and reflect their selves-learning straightforwardly.	strength	0.052	4.05	0.211	5
9. To encourage students to share ideas and summarize of the theory in describing the issues.	strength	0.012	3.90	0.047	12
10. To provide opportunity for students to reflect learning and giving feedback.	strength	0.043	3.96	0.190	6

Table 4.10 (continued)

internal environmental factors	strength /weakness	weight	mean	real score	order
11. To create provocative atmosphere, challenging, and encouraging students with the ambiguous issue.	strength	0.055	4.18	0.233	3.5
12. To provide time to think analytically to find answer on their own.	strength	0.062	3.99	0.247	2
13. To work involving learning systematically and reflect self-learning straightforward.	strength	0.040	3.94	0.158	8
14. To set goals and cooperate with instructors to design instruction for critical thinking enhancement.	weakness	0.015	3.25	.059	10
15. To manage supporting instructional design for critical thinking enhancement.	weakness	0.022	2.80	.072	8
16. To identify objectives of instructional design focused on student centered for critical thinking enhancement.	weakness	0.071	3.25	0.199	4
17. To design and plan for diverse and appropriate instructional design for students to enhance critical thinking.	weakness	0.074	3.04	0.241	2
18. To provide activities to stimulate students' thoughts.	weakness	0.034	3.37	.103	6
19. To use process of conclusion of the minor issues to describe eyeview issue (inductive).	weakness	0.009	3.50	0.030	11

Table 4.10 (continued)

internal environmental factors	strength /weakness	weight	mean	real score	order
20. create atmosphere during instruction for students to feel free to express their opinions.	weakness	0.065	3.39	0.228	3
21. cooperate with instructors to establish instructiona design.	weakness	0.018	3.47	0.061	9
22. anlayze reliability of data rationally and clearly.	weakness	0.025	3.40	.085	7
23. link related information.	weakness	0.068	3.59	0.236	1
24. feel free to discuss during instruction.	weakness	0.058	3.98	0.231	5
25. use process of inductive and deductive	weakness	0.006	3.20	0.019	12
Total	**strength**	0.535		2.120	
	weakness	0.465		1.850	

From Table 4.10: The results of weighted scores for internal environmental factors showed that the factors with highest order of strength were 'To stipulate and promote instructional policy on student-centered obviously' followed by 'provide time to think analytically to find answer on their own'. The weighted score of strength was 0.535 and real score was 2.120. The factors with highest order of weakness were 'link related information' and followed by 'design and plan for diverse and appropriate instructional design for students to enhance critical thinking'. The weighted score of weakness was 0.465 and real score was 1.850.

Table 4.11 Weighted scores for external environmental factors: critical thinking enhancement for nursing students.

external environmental factors	opportunity /thrat	weight	mean	real score	order
1. Thai Nursing Council specifies criteria to certify institute using percentage of students passing licensure examination.	opportunity	0.040	3.24	0.100	4
2. Extensive IT system to facilitate information searching.	opportunity	0.140	3.78	0.530	1
3. Health care settings are adequate for students' placement.	opportunity	0.110	3.12	0.340	2
4. Supervisory board supports learning resources.	opportunity	0.070	2.78	0.190	3
5. Ratio of instructors per students not conducive for instruction to enhance critical thinking due to time constraint.	threat	0.250	3.25	0.810	2
6. Educational system in Thailand is not conductive for students to master analytical skills.	threat	0.210	4.15	0.800	1
7. Context greatly facilitates learning experience for students to outweigh existing obstacles.	threat	0.180	4.01	0.720	3
Total	opportunity	0.360		1.200	
	threat	0.670		2.410	

Table 4.11: The results of weighted scores for external environmental factors showed that the factors with highest order of opportrinity were 'Extensive IT system to facilitate information searching' followed by 'Health care settings are adequate for students' placement'. The weighted score of opportunity was 0.360 and real score was 1.200. The factors with highest order of threat were 'Educational system in

Thailand is not conductive for students to master analytical skills' followed by 'Ratio of instructors per student not conducive for instruction to enhance critical thinking due to time constraint'. The weighted score of threat was 0.670 and real score was 2.410.

Table 4.12 SWOT analysis of internal environmental factors for critical thinking enhancement and topics for strategies constructing.

Code	Strength	Topic for strategy	Code	Weakness	Topic for strategy
S1	To stipulate and promote instructional policy on student-centered obviously.	Instructional management.	W1	To link related information.	Characteristics and skills of critical thinking in nursing student.
S2	To provide time to think analytically to find answer on their own.	Characteristics and skills of critical thinking in nursing student.	W2	To design and plan for diverse and appropriate instructional design for students to enhance critical thinking.	Capacity development for instructional design.
S3	To adjust strategies and learning activities for students using their potential under the concept of individual difference.	Capacity development for instructional design.	W3	To create atmosphere during instruction for students to feel free to express their opinions.	Capacity development for instructional design.
S4	To create provocative atmosphere, challenging and encouraging students with the ambiguous issue.	Capacity development for instructional design.	W4	To determine objectives of instructional design focused on student centered for critical thinking enhancement.	Capacity development for instructional design.

Table 4.12 (continued)

Code	Strength	Topic for strategy	Code	Weakness	Topic for strategy
S5	To encourage and provide opportunities for students to discuss and reflect their selve-learning straightforwardly.	Capacity development for instructional design.	W5	To feel free to discuss during instruction.	Capacity development for instructional design.
S6	To provide opportunity for students to reflect learning and giving feedback.	Characteristics and skills of critical thinking in nursing student.	W6	To provide activities stimularious students to make various thoughts.	Capacity development for instructional design.
S7	To use technique to stimulate students to search continually.	Capacity development for instructional design.	W7	To anlayze reliability of data rationally and clearly.	Characteristics and skills of critical thinking in nursing student.
S8	To work involving learning systematically and reflect self-learning straightforwardly.	Characteristics and skills of critical thinking in nursing student.	W8	To manage for supporting instructional design for critical thinking enhancement.	Instructional design management.

Table 4.12 (continued)

Code	Strength	Topic for strategy	Code	Weakness	Topic for strategy
S9	To recommend students to search knowledge from various resources.	Capacity development for instructional design.	W9	To cooperate with instructors to establish instructional design.	Instructional design management.
S10	To provide opportunity for students to reflect learning and having feedback.	Development and management of contributing factors for instructional design.	W10	To set goals and cooperate with instructors to design instruction for critical thinking enhancement.	Instructional design management.
S11	To provide contributing things for searching from variuos resources.	Development and management of contributing factors for instructional design.	W11	To use process of conclusion of the minor issues to describe eyeview issue (inductive).	Capacity development for instructional design.
S12	To encourage students to share ideas and summarize theory in describing the issues.	Characteristics and skills of critical thinking in nursing student.	W12	To use process of inductive and deductive.	Characteristics and skills of critical thinking in nursing student.

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Table 4.12 (continued)

Code	Strength	Topic for strategy	Code	Weakness	Topic for strategy
S13	To support and facilitate materials, instruments and medias for instructional design for critical thinking enhancement.	Development and management of contributing factors for instructional design.			

From Table 4.12:   Internal environmental factors for critical thinking enhancement were 13 items of strength:1 item was use as guideline to construct strategies in aspect of instructional design management; 3 items were use as guideline to construct strategies in aspect of development and management of contributing factors for instructional design; 5 items were use as guideline to construct strategies in aspect of capacity development for instructional design; and 4 items were use as guideline to construct strategies in aspect of characteristics and skills of critical thinking in nursing student. For 12 items of weakmness: 3 items were use as guideline to construct strategies in aspect of instructional design management; 6 items were use as guideline to construct strategies in aspect of capacity development for instructional design; 3 items were use as guideline to construct strategies in aspect of characteristics and skills of critical thinking in nursing student.

Table 4.13 SWOT analysis of external environmental factors for critical thinking enhancement and guideline for strategies constructing.

Code	Opportunity	Topic for strategy	Code	Threat	Topic for strategy
O1	Extensive IT system to facilitate information searching.	Development and management of contributing factors instructional design.	T1	Educational system in Thailand is not conducive for students to master analytical skills.	Instructional design management.
O2	Health care settings are adequate for students' placement.	Development and management of contributing factors for instructional design.	T2	Ratio of instructors per student not conducive for instruction to enhance critical thinking due to time contraint.	Instructional design management.
O3	Supervisory board supports learning resources.	Instructional design management.	T3	Context greatly facilitates learning experience for students to outweigh existing obstacles.	Instructional design management.

Table 4.13 (continued)

Code	Opportunity	Topic for strategy	Code	Threat	Topic for strategy
O4	Thai Nursing Council specifies criteria to certify institute using percentage of students passing licensure examination.	Capacity development for instructional design.			

From Table 4.12: External environmental factors for critical thinking enhancement were 4 items of opportunity: 1 item was used as guideline to construct strategies in aspect of instructional design management; 2 items were used as guideline to construct strategies in aspect of development and management of contributing factors for instructional design; 1 items was used as guideline to construct strategies in aspect of capacity development for instructional design. For 3 items of of threat, all items were used as guideline to construct strategies in aspect of instructional design management.
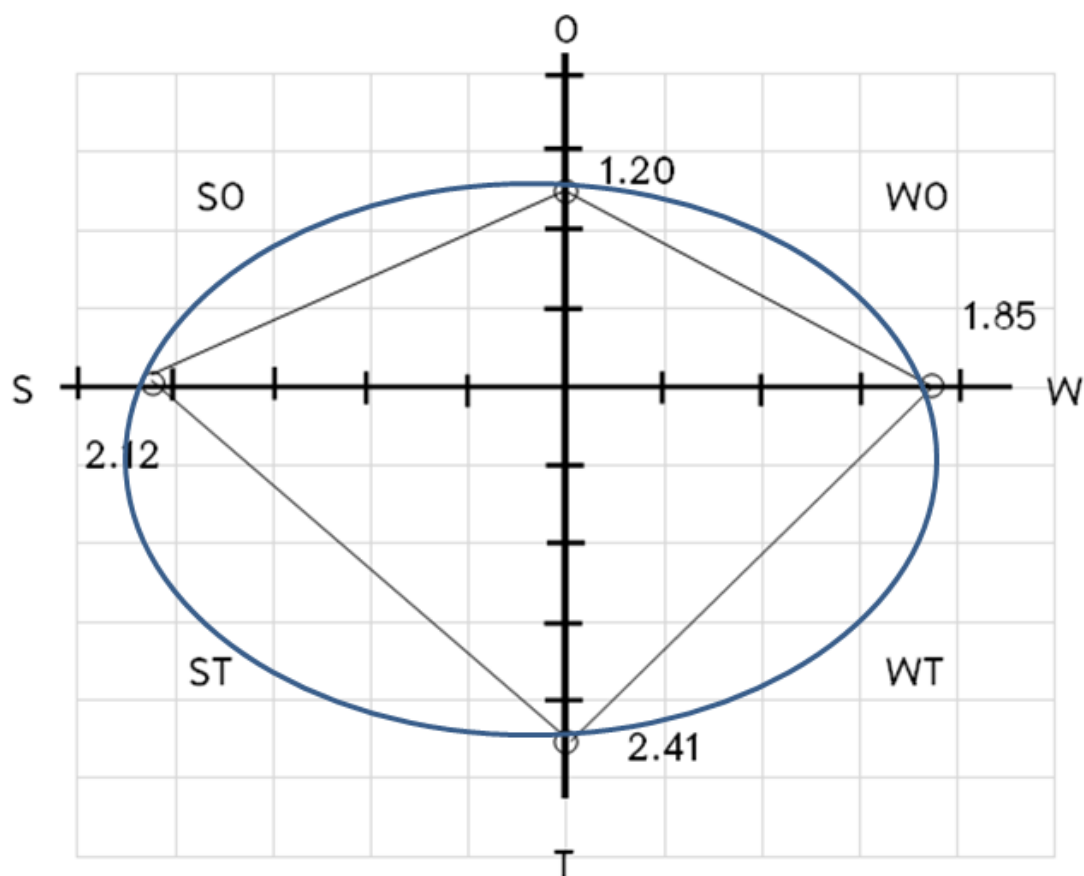
Figure 4.1 The result of environmental factors analysis

From figure 4.1: SWOT analysis revealed the "strengths-threats" status of critical thinking enhancement in nursing institutes. However, after careful consideration, strength in nursing institute should be of concern to eradicate threat or obstacle existed in the institute. Therefore, the strategies should focus on promotion of internal environemental factors and eradicate threat in institute.

After using SWOT analysis technique to analyze internal and external situation, subjects discussed and concluded the preliminary strategies for critical thinking enhancement for nursing students. The elements of preliminary strategies consisted of 1 vision; 4 missions; 4 goals; 4 strategy issues; 9 strategies; 17 measures; 31 indicators; and 31 meausrements and criterias of evaluation. The details were presented in table 4.14 - 4.19.

Table 4.14 The preliminary strategies for critical thinking enhancement
for nursing students.

Issue	content
Vision	Nursing students demonstrate characteristics and skills on critical thinking.
Mission	1. Provision of instructional design management focused on critical thinking enhancement. 2. Provision and management of contributing factors to instructional design focused on critical thinking enhancement. 3. Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement. 4. Promotion and reinforcement of nursing students' development to become critical thinkers.
Goals	1. Manage instructional design focused on critical thinking enhancement. 2. Provide contributing factors to instructional design focused on critical thinking enhancement. 3. Instructor is able to design instruction focused on critical thinking enhancement. 4. Develop nursing students to become critical thinkers.

Table 4.14 (continued)

issue	Content
Strategy issues	1. Instructional design management focused on critical thinking enhancement.
	2. Provision and management of contributing factors to instructional design focused on critical thinking enhancement.
	3. Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement.
	4. Promoting and strengthening nursing students' development to become critical thinkers.

Table 4.15 The preliminary strategies for critical thinking enhancement
for nursing students: strategy issues.

issue	content
Strategy issues 1: Instructional design management focused on critical thinking enhancement.	**Strategy I** : Increase participation in policy setting in instructional design focused on critical thinking. enhancement. **Strategy II** : Promote implementation for critical thinking enhancement.
Strategy issues 2: Provision and management of contributing factors to instructional design focused on critical thinking enhancement.	**Strategy III**: Promote and support various instructional resources for instructors and students. **Strategy IV**: Develop technology and its network to support the production of media and activities for variuos instructional design. **Strategy V**: Supply building and space to facilitate self-directed learning and knowledge sharing.
Strategy issues 3: Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement.	**Strategy VI**: Promote recognition and positive attitude on management of instructional design focused on critical thinking enhancement. **Strategy VII**: Support instructors to gain knowledge and confidence to design instruction focused on critical thinking. **Strategy VIII**: Amplify the use of medias and various technologies for critical thinking enhancement among instructors.
Strategy issues 4 : Promoting and strengthening nursing students' development to become critical thinkers.	**Strategy IX**: Promote and support the integration of instructional design focused on critical thinking enhancement.

Table 4.16 Strategy issues 1: Instructional design management focused on

critical thinking enhancement.

Measure	Indicator	Measurement and criteria for evaluation
Strategy I : Increase participation in policy setting in instructional design focused on critical thinking enhancement.		
1. Assign instructors to participate in policy setting on instructional design focused on critical thinking enhancement.	1. Number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.	1. Examination on number of instructor participating in policy setting on instructional design focused on critical thinking enhancement. (> 90%).
2. Provide opportunity for instructor to identify guideline on management that congruent to policy for instructional design focused on critical thinking enhancement.	2. Quality of guideline on management congruent to policy for instructional design focused on critical thinking enhancement.	2. Evaluation quality of guideline on management congruent to policy for instructional design focused on critical thinking enhancement. (level $\geq$ good).

Table 4.16 (continued)

Measure	Indicator	Measurement and criteria for evaluation
Strategy II : Promote implementation for critical thinking enhancement.		
3. Provide opportunity for instructor to introduce activities for critical thinking enhancement.	3. Number of activities for critical thinking enhancement.	3. Examination on number of activities for critical thinking enhancement (not less than 3 activities).
4. Promote activities for characteristic and skill of critical thinking evaluation.	4.1 Number of activities for characteristic and skill of critical thinking evaluation.	4.1 Examination on number of activities for characteristic and skill of critical thinking evaluation (not less than 3 activities).
	4.2 Level of pariticipant's satisfaction.	4.2 Satisfaction of pariticipant (satisfaction level $\geq$ good).

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Table 4.17 Strategy issues 2: Provision and management of contributing factors to instructional design

focused on critical thinking enhancement.

Measure	Indicator	Measurement and criteria for evaluation
Strategy III: Promote and support various instructional resources for instructors and students.		
5. Provide various resources for members in institutes.	5. Number of resources in institutes.	5. Examination on number of resources in institutes (at least 15resources).
Strategy IV: Develop technology and its network to support the production of media and activities for variuos instructional design.		
6. Supply computer sufficient to students' needs for knowledge searching.	6. Number of computer for students.	6. Examination on number of computer for students (number of computer per student = 1:50).
7. Provide wifi or LAN conducive to access for searching and high speed internet in the institute.	7. Number of access point for wifi or LAN and high speed internet in the institute.	7. Examination on number of access point for wifi or LAN and high speed internet in the institute (quality of access point for wifi or LAN 100%).

Table 4.17 (continued)

Measure	Indicator	Measurement and criteria for evaluation
Strategy IV: (continued)		
8. The expansion of network in institutions for supporting to produce media technology for self-learning.	8.1 Number of area in network system for instructor to produce media technology for self-learning.	8.1 Area in network system for instructor to produce media technology for self-learning (number of area in network system 100%).
	8.2 Number of system and network administrator.	8.2 System and network administrator (number of staff: instructor = 1:150).

Table 4.18 Strategy issues 3: Augmentation of instructors' capacities on instructional design focused on

critical thinking enhancement.

Measure		Indicator		Measurement and criteria for evaluation

Strategy V: Supply building and space to facilitate self-directed learning and knowledge sharing.

| 9. | Supply building and space for self- learning and knowledge sharing. | 9.1 | Number of meeting rooms for small group . | 9.1 | Examinination on number of meeting room for small group (at least 1:50). |
| | | 9.2 | Number of rooms with IT system and network for self-learning. | 9.2 | Examinination on number of rooms with IT system and network for self-learning per students (at least 1:50). |

Strategy VI: Promote recognition and positive attitude on management of instructional design focused on critical thinking enhancement.

| 10. | Increase recognition and positive attitude on management of instructional design focused on critical thinking enhancement for instructors. | 10.1 | Number of instructor embedded positive attitude on management of instructional design focused on critical thinking enhancement. | 10.1 | Examination on number of instructor embedded positive attitude (> 90 %). |
| | | 10.2 | Satisfaction level of instructor embedded positive attitude on management of instructional design | 10.2 | Evaluation of satisfaction of instructors embedded positive attitude (Satisfaction in level of 'good'). |

Table 4.18 (continued)

Measure		Indicator		Measurement and criteria for evaluation
		focused on critical thinking enhancement.		
	10.3	Quality of instructional design focused on critical thinking enhancement of instructor embedded positive attitude.	10.3	Evaluation on quality of instructional design (quality of instructional design $\geq$ good).
Strategy VII: Support instructors to gain knowledge and confidence to design instruction focused on critical thinking				
11. Training instructor to increase knowledge and understanding on method of instructional design for critical thinking enhancement.	11.1	Level of knowledge and understanding of instructor on method of instructional design for critical thinking enhancement.	11.1	Evaluation of knowledge and understanding of instructor on method of instructional design for critical thinking enhancement (level of knowledge and understand of instructor $\geq$ good).

Table 4.18 (continued)

Measure	Indicator	Measurement and criteria for evaluation
Strategy VII: (continued)		
12. Promote instructor to improve on instructional design by their potential and needs.	12.1 Number of instructor improving on instructional design by their potential and needs.	12.1 Examination on number of instructor improving on instructional design by their potential and needs (> 80%).
	12.2 Level of instructors'satisfaction on improving on instructional design by their potential and needs.	12.2 Evaluation on instructors'satisfaction on improving on instructional design by their potential and needs (level ≥ good)
13. Promote and support on morale and encouragement for instructor to administer instructional design focused on critical thinking enhancement.	13.1 Percentage of instructor to administered instructional design focused on critical thinking enhancement.	13.1 Examination and evaluation of instructional design focused on critical thinking enhancement administration of instructor (level of administering instructional design ≥ good).

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Table 4.18 (continued)

Measure	Indicator	Measurement and criteria for evaluation
Strategy VII: (continued)		
	13.2 Number of administered instructional design focused on critical thinking enhancement.	13.2 Examination on number of administered instructional design focused on critical thinking enhancement (at least 5 method).
	13.3 Number of activities received budget to manage instructional design focused on critical thinking enhancement.	13.3 Examination on number of activities received budget to manage instructional design focused on critical thinking enhancement. (at least 5 activities).
14. Promote and support on knowledge sharing for instructor to design instruction focused on critical thinking enhancement.	14.1 Percentage of instructors participating on knowledge sharing to design instruction focused on critical thinking enhancement.	14.1 Examination and evaluation on number of instructors participating to share knowledge to design instruction focused on critical thinking enhancement (≥ 90 %).

Table 4.18(continued)

Measure	Indicator	Measurement and criteria for evaluation
	14.2 Satisfaction of instructors participating in knowledge sharing to design instruction focused on critical thinking enhancement.	14.2 Level of satisfaction of instructors participating in knowledge sharing (level ≥ good).

Strategy VIII: Amplify the use of medias and various technologies for critical thinking enhancement among instructors.

Measure	Indicator	Measurement and criteria for evaluation
15. Provide trainning to create medias and technologies for critical thinking enhancement among instructors.	15.1 Percentage of instructors' participation in training to creat medias.	15.1 Examination and evaluation of instructors to create medias (≥ 90%).
	15.2 Satisfaction of instructors participating in training to create medias.	15.2 Level of satisfaction of instructors participating in training to create medias (level ≥ good).
16. Provide medias creating for critical thinking enhancement.	16.1 Number of medias for critical thinking enhancement.	16.1 Examination on number of medias for critical thinking enhancement (at least 5 medias).
	16.2 Number of medias of self-learning for students.	16.2 Examination on number of medias of self-learning for students. (at least 5 medias).

Table 4.19 Strategy issues 4: Promoting and strengthening nursing students' development to become critical thinkers.

Measure	Indicator	Measurement and criteria for evaluation
Strategy IX: Promote and support the integration of instructional design focused on critical thinking enhancement.		
17. Promote and support activities to integrate nursing process and critical thinking to enhance critical thinking characteristic and skills.	17.1 Number of activities that integrate nursing process and critical thinking to enhance critical thinking characteristic and skills.	17.1 Examination on number of activities that integrate nursing process and critical thinking to enhance critical thinking characteristic and skills (at least 5 activities).
	17.2 Level of students' satisfaction in activities participation.	17.2 Evaluation on students' satisfaction in activities participation.(level ≥ good).
	17.3 Student with characteristic and skills of critical thinking.	17.3 Evaluation on characteristic and skills of critical thinking. (level of characteristic ≥ good, score of critical thinking skills after participation better than before participating).

Part 2.2 Experts' opinion on preliminary strategies on critical thinking enhancement for nursing student.

Researcher asked experts to evaluate the preliminary strategy of critical thinking enhancement for nursing student. The issues to evaluate included 1) accuracy; 2) propriety; 3) feasibility; and 4) utility. The results were as followed

Table 4.20 Experts' opinion on the preliminary strategy of critical thinking enhancement for nursing student.

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Vision				
Nursing students demonstrate characteristics and skills on critical thinking.	4.20	4.20	4.60	4.80
Mission				
1. Provision of instructional design management focused on critical thinking enhancement.	4.80	4.80	4.80	5.00
2. Provision and management of contributing factors to instructional design focused on critical thinking enhancement.	4.80	4.60	4.60	5.00
3. Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement.	5.00	4.80	5.00	5.00
4. Promotion and reinforcement of nursing students' development to become critical thinkers.	5.00	4.80	5.00	5.00
Goals				
1. Manage instructional design focused on critical thinking enhancement.	5.00	5.00	5.00	5.00
2. Provide contributing factors to instructional design focused on critical thinking enhancement.	5.00	5.00	5.00	5.00

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
3. Instructor is able to design instruction focused on critical thinking enhancement.	5.00	5.00	5.00	5.00
4. Develop nursing students to become critical thinkers.	5.00	5.00	5.00	5.00
Strategy issue 1: Instructional design management focused on critical thinking enhancement.				
Strategy I : Increase participation in policy setting in instructional design focused on critical thinking. Enhancement.	4.60	4.20	4.60	4.80
Measure 1: Assign instructors to participate in policy setting on instructional design focused on critical thinking enhancement.	4.20	4.40	4.80	4.80
Indicator 1: Number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.	4.80	4.20	4.80	4.60
Measurement and criteria for evaluation 1: Examination on number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.	4.60	4.20	4.40	4.40

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measure 2: Provide opportunity for instructor to identify guideline on management that congruent to policy for instructional design focused on critical thinking enhancement. Provide opportunity for instructor to identify guideline on management that congruent to policy for instructional design focused on critical thinking enhancement.	4.40	4.20	4.40	4.80
Indicator 2: Quality of guideline on management congruent to policy for instructional design focused on critical thinking enhancement.	4.00	3.80	3.80	4.00
Measurement and criteria for evaluation 2: Evaluation quality of guideline on management congruent to policy for instructional design focused on critical thinking enhancement. (level ≥ good).	4.60	4.60	4.60	4.80
Strategy 2: Promote implementation for critical thinking enhancement.	4.80	4.80	4.80	4.80
Measure 3: Provide instructor to set activities for critical thinking enhancement.	4.80	4.80	4.80	4.80
Indicator 3 Number of activities for critical thinking enhancement.	4.80	4.40	4.40	4.40

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measurement and criteria for evaluation 3				
Examination on number of activities for critical thinking enhancement (not less than 3 activities).	4.80	4.40	4.60	4.80
Measure 4				
Promote activities for characteristic and skill of critical thinking evaluation.	4.80	4.60	4.80	4.80
Indicator 4.1				
Number of activities for characteristic and skill of critical thinking evaluation.	4.80	4.80	4.80	4.80
Indicator 4.2				
Level of pariticipant's satisfaction.	3.00	3.00	3.60	3.40
Measurement and criteria for evaluation 4.1				
Examination on number of activities for characteristic and skill of critical thinking evaluation (not less than 3 activities).	4.80	4.20	4.80	4.80
Measurement and criterial for evaluation4.2				
Satisfaction of pariticipant (satisfaction level $\geq$ good).	2.60	2.40	2.60	2.60
Strategy issues 2 :				
Provision and management of contributing factors to instructional design focused on critical thinking enhancement.				
Strategy III:				
Promote and support various instructional resources for instructors and students.	4.40	4.40	4.40	4.40

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measure 5				
Provide various resources for members in institutes.	4.80	4.00	4.80	4.80
Indicator 5				
Number of resources in institutes.	4.20	3.60	4.00	4.20
Measurement and criteria for evaluation 5				
Examination on number of resources in institutes (at least 15resources).	4.20	4.20	4.20	4.20
Strategy IV:				
Develop technology and its network to support the production of media and activities for variuos instructional design.	4.80	4.80	4.80	4.80
Measure 6				
Supply computer sufficient to students' needs for knowledge searching.	4.80	4.80	4.80	4.80
Indicator 6				
Number of computer for students.	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation 6				
Examination on number of computer for students (number of computer per student = 1:50).	4.80	4.80	4.80	4.80
Measure 7				
Provide wifi or LAN conducive to access for searching and high speed internet in the institute.	4.00	4.60	4.80	5.00
Indicator 7				
Number of access point for wifi or LAN and high speed internet in the institute.	4.80	4.80	5.00	5.00

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measurement and criterial evaluation 7 Examination on number of access point for wifi or LAN and high speed internet in the institute (quality of access point for wifi or LAN 100%).	4.60	4.60	4.60	4.60
Measure 8 The expansion of network in institutions for supporting to produce media technology for self-learning.	4.80	4.80	4.80	4.80
Indicator 8.1 Number of area in network system for instructor to produce media technology for self-learning.	4.00	4.00	4.00	4.00
Indicator 8.2 Number of system and network administrator.	3.40	3.40	3.40	3.40
Measurement and criteria for evaluation 8.1 Area in network system for instructor to produce media technology for self-learning (number of area in network system 100%).	4.60	4.60	4.60	4.60
Measurement and criterial for evaluation8.2 System and network administrator (number of staff: instructor = 1:150).	4.60	4.60	4.60	4.60

Strategy Issue 3:

Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement.

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Strategy V:				
Supply building and space to facilitate self-directed learning and knowledge sharing.	4.60	4.60	4.60	4.60
Measure 9				
Supply building and space for self- learning and knowledge sharing.	4.80	4.80	4.80	4.80
Indicator 9.1				
Number of meeting rooms for small group.	4.80	4.80	4.80	4.80
Indicator 9.2				
Number of rooms with IT system and network for self-learning.	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation 9.1				
Examinination on number of meeting room for small group (at least 1:50).	4.00	4.00	4.00	4.00
Measurement and criteria for evaluation 9.2				
Examinination on number of rooms with IT system and network for self-learning per students (at least 1:50).	4.00	4.00	4.00	4.00
Strategy VI:				
Promote recognition and positive attitude on management of instructional design focused on critical thinking enhancement.	4.80	4.80	4.80	4.80

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measure 10				
Increase recognition and positive attitude on management of instructional design focused on critical thinking enhancement for instructors.	4.80	4.80	4.80	4.80
Indicator 10.1				
Number of instructor to embed positive attitude on management of instructional design focused on critical thinking enhancement.	4.80	4.80	4.80	4.80
Indicator 10.2				
Satisfaction level of instructor with positive attitude on management of instructional design focused on critical thinking enhancement.	4.00	4.00	4.00	4.00
Indicator 10.3				
Quality of instructional design focused on critical thinking enhancement of instructor embedded positive attitude**.**	2.80	2.80	2.80	2.80
Measurement and criteria for evaluation10.1				
Examination on number of instructor embedded positive attitude (> 90 %).	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation10.2				
Evaluation instructors' evaluation embedded positive attitude (Satisfaction in level of good).	4.00	4.00	4.00	4.00
Measurement and criterial for evaluation10.3				
Evaluation on quality of instructional design (quality of instructional design ≥ good).	3.20	3.20	3.20	3.20

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Strategy VII: Support instructors to gain knowledge and confidence to design instruction focused on critical thinking.	5.00	5.00	5.00	5.00
Measure 11 Training instructor to increase knowledge and understanding on method of instructional design for critical thinking enhancement.	5.00	5.00	4.00	5.00
Indicator 11.1 Level of knowledge and understanding of instructor on method of instructional design for critical thinking enhancement.	5.00	5.00	5.00	5.00
Indicator 11.2 Number of instructional design for critical thinking enhancement.	5.00	5.00	5.00	5.00
Measurement and criteria for evaluation11.1 Evaluation of knowledge and understanding of instructor on method of instructional design for critical thinking enhancement (level of knowledge and understand of instructor $\geq$ good).	4.60	4.80	4.80	4.80
Measurement and criteria for evaluation 11.2 Examination on number of instructional design for critical thinking enhancement (at least 5 methods).	3.40	3.40	3.40	3.40

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measure 12				
Promote instructor to improve on instructional design by their potential and needs.	4.80	4.00	4.80	4.80
Indicator 12.1				
Number of instructor improving on instructional design by their potential and needs.	4.80	4.80	4.80	4.80
Indicator 12.2				
Level of instructors'satisfaction on improving on instructional design by their potential and needs.	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation 12.1				
Examination on number of instructor improving on instructional design by their potential and needs (> 80%).	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation 12.2				
Evaluation on instructors'satisfaction on improving on instructional design by their potential and needs (level ≥ good).	4.80	4.80	4.80	4.80
Measure 13				
Promote and support on morale and encouragement for instructor to administer instructional design focused on critical thinking enhancement.	4.80	4.60	4.60	4.60
Indicator 13.1				
Percentage of instructor administered instructional design focused on critical thinking enhancement.	3.40	3.40	3.40	3.40

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Indicator 13.2				
Number of administered instructional design focused on critical thinking enhancement.	3.40	3.40	3.40	3.40
Indicator 13.3				
Number of activities received budget to manage instructional design focused on critical thinking enhancement.	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation13.1				
Examination and evaluation of instructional design focused on critical thinking enhancement administration of instructor (level of administering instructional design $\geq$ good).	3.00	3.00	3.00	3.00
Measurement and criteria for evaluation 13.2				
Examination on number of administered instructional design focused on critical thinking enhancement (at least 5 method).	3.00	3.00	3.00	3.00
Measurement and criteria for evaluation 13.3				
Examination on number of activities received budget to manage instructional design focused on critical thinking enhancement. (at least 5 activities).	4.80	4.80	4.80	4.80
Measure 14				
Promote and support on knowledge sharing for instructor to design instruction focused on critical thinking enhancement.	5.00	5.00	5.00	5.00

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Indicator 14.1				
Percentage of instructors participating on knowledge sharing to design instruction focused on critical thinking enhancement.	5.00	5.00	5.00	5.00
Indicator 14.2				
Satisfaction of instructors participating in knowledge sharing to design instruction focused on critical thinking enhancement.	5.00	5.00	5.00	5.00
Measurement and criteria for evaluation 14.1				
Examination and evaluation on number of instructors participating to share knowledge to design instruction focused on critical thinking enhancement ($\geq$ 90 %).	5.00	5.00	5.00	5.00
Measurement and criteria for evaluation 14.2				
Level of satisfaction of instructors participating in knowledge sharing (level $\geq$ good).	4.80	4.80	4.80	4.80
Strategy VIII:				
Amplify the use of medias and various technologies for critical thinking enhancement among instructors.	4.80	4.80	4.80	4.80
Measure 15				
Provide trainning to create medias and technologies for critical thinking enhancement among instructors.	4.80	4.80	4.80	4.80
Indicator15.1				
Percentage of instructors' participation in training to creat medias.	4.80	4.80	4.80	4.80

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Indicator15.2				
Satisfaction of instructors participating in training to create medias.	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation 15.1				
Examination and evaluation of instructors to create medias ($\geq$ 90%).	4.80	4.80	4.80	4.80
Measurement and criteria for evaluation 15.2				
Level of satisfaction of instructors participating in training to create medias (level $\geq$ good).	4.80	4.80	4.80	4.80
Measure 16				
Provide medias creating for critical thinking enhancement.	5.00	5.00	5.00	5.00
Indicator 16.1				
Number of medias for critical thinking enhancement.	5.00	5.00	5.00	5.00
Indicator 16.2				
Number of medias of self-learning for students.	5.00	5.00	5.00	5.00
Measurement and criteria evaluation 16.1				
Examination on number of medias for critical thinking enhancement (at least 5 medias).	5.00	5.00	5.00	5.00
Measurement and criteria evaluation 16.2				
Examination on number of medias of self-learning for students**.** (at least 5 medias).	5.00	5.00	5.00	5.00

Strategy issues 4 :

Promoting and strengthening nursing students' development to become critical thinkers.

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Strategy IX:				
Promote and support the integration of instructional design focused on critical thinking enhancement.	5.00	5.00	5.00	5.00
Measure 17				
Promote and support activities to integrate nursing process and critical thinking to enhance critical thinking characteristic and skills.	5.00	5.00	5.00	5.00
Indicators 17.1				
Number of activities that integrate nursing process and critical thinking to enhance critical thinking characteristic and skills.	5.00	5.00	5.00	5.00
Indicators 17.2				
Level of students' satisfaction in activities participation.	5.00	5.00	5.00	5.00
Indicators 17.3				
Student with characteristic and skills of critical thinking.	5.00	5.00	5.00	5.00
Measurement and criteria for evaluation 17.1:				
Examination on number of activities that integrate nursing process and critical thinking to enhance critical thinking characteristic and skills (at least 5 activities).	5.00	5.00	5.00	5.00
Measurement and criteria for evaluation 17.2:				
Evaluation on students' satisfaction in activities participation.(level ≥ good).	5.00	5.00	5.00	5.00

Table 4.20 (continued)

Issues for evaluation	Accuracy	Propriety	Feasibility	Utility
Measurement and criteria for evaluation 17.3: Evaluation on characteristic and skills of critical thinking. (level of characteristic ≥ good, score of critical thinking skills after participating better than before participating).	4.60	4.60	4.80	5.00

From Table 4.20: Mean scores of experts' opinion <3.5 were as followed:

1. Strategy issue 1: Strategy 2; Measure 4; Indicator 4.2: Level of pariticipant's satisfaction, and Measurement and criteria for evaluation 4.2 : Satisfaction of pariticipant (satisfaction level ≥ good).

2. Strategy issue 2: Strategy 4; Measure 8; Indicator 8.2: Number of system and network administrator, and Measurement and criteria for evaluation 8.2 : System and network administrator (number of staff: instructor = 1:150).

3. Strategy issue 3: Strategy 6, Measure 10, Indicator 10.3: Quality of instructional design focused on critical thinking enhancement of instructor embedded positive attitude, and Measurement and criteria for evaluation 10.3 : Evaluation on quality of instructional design (quality of instructional design ≥ good).

4. Strategy issue 3: Strategy 7, Measure 11, and Measurement and criterial for evaluation 11.2 : Examination of number of instructional design for critical thinking enhancement (number of instructional design at least 5 methods).

5. Strategy issue 3: Strategy 7, Measure 13, Indicator 13.1: Percentage of instructor administered instructional design focused on critical thinking enhancement, Measurement and criterial for evaluation 13.1 Examination and evaluation instructor to administer instructional design focused on critical thinking enhancement (level of administrating instructional design ≥ good), Indicator 13.2: Number of administered instructional design focused on critical

thinking enhancement , and Measurement and criterial for evaluation 13.2 Examination on administer instructional design focused on critical thinking enhancement.(number of administer instructional design at least 5 method).

Regarding analyzing experts'opinion on the preliminary strategies on critical thinking enhancement for nursing students in the aspects of 1) accuracy; 2) propriety; 3) feasibility 4) utility and their recommendation, researcher modified some details as followed:

1. Language: adjusted language used to be concise and clear.
2. Categories: moved measure; indicator; and measurement and criteria for evaluation into appropriate catagories.
3. Exclusion: criteria for evaluations were removed because each criterion is depended on the context of each institute.

Part 2.3 Characteristics of Strategy to enhance critical thinking for nursing students.

After modifying as suggested by experts, researcher analyzed and concluded characteristics of strategy to enhance critical thinking for nursing students in public institute as followed.

1. Strategy to develop critical thinking for nursing students should focus on tntegration and harmonization of all aspects of 1) role of academic administrator, 2) management of contributing factors to enhance critical thinking, 3) role of instructors, and 4) role of nursing students.

2. The elements of strategies should be consisted of 1) instructional design management focused on critical thinking enhancement, 2) Provision and management of contributing factors to instructional design focused on critical thinking enhancement,3) Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement, and 4) Promoting and strengthening nursing students' development to become critical thinkers.

3. Characteristics of strategy management should ~~be~~ promote on development characteristic of nursing students to become sustainable critical thinkers lifelong learners. Characteristics of strategy management should be as followed:

    3.1 Instructor fostering: Instructors should be provided opportunities to increasingly participate in policy setting on instructional design, increase recognition and positive attitude on management of instructional design focused on critical thinking enhancement for instructors, augmente competency of instructors, and promote morale and encouragement for instructors to administer instructional design focused on critical thinking enhancement.

    3.2 Environmental management: Admintrator should support environmental development for various instructional design focused on critical thinking enhancement and develop extracurricular activities for critical thinking enhancement.

3.3 Nursing students' development: Instructional design should focus on
integration of critical thinking enhancement and appraisal
of characteristics and skills of critical thinking in nursing students.

The strategy to enhance critical thinking for nursing students in public institutes were
presented in table 4.21.

Table 4.21 The strategies to enhance critical thinking for nursing students.

Strategy issue	Strategy	Measure	Indicator	Evaluation
1.Instructional design management focused on critical thinking enhancement.	1.Increase participation in policy setting in instructional design focused on critical thinking enhancement.	1. assigning instructors to participate in policy setting on instructional design focused on critical thinking enhancement.	1.1 Number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.	1.1 Examinination on number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.
			1.2 Policy on instructional design focused on critical thinking enhancement.	1.2 Examinination and evaluation of policy on instructional design focused on critical thinking enhancement.
		2. identifying guideline on management of instructional design focused on critical	2. Provide guideline on management for instructional design focused on critical	2. Evaluation quality of guideline on management as policy for instructional design

Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
		thinking enhancement.	thinking enhancement.	focused on critical thinking enhancement.
	2. Promote recognition and positive attitude on management of instructional design focused on critical thinking enhancement.	3. increasing recognition and positive attitude on management of instructional design focused on critical thinking enhancement for instructors.	3. Number of instructor to embed positive attitude on management of instructional design focused on critical thinking enhancement.	3. Examination on instructor embeded positive attitude on management of instructional design focused on critical thinking enhancement.
		4. regulating terms of reference (TOR) for instructors to instructional design focused on critical thinking enhancement.	4. Acknowledgement of designation in terms of reference for instructors to design instruction focused on critical thinking enhancement.	4. Designation in terms of reference for instructors to design instruction focused on critical thinking enhancement.

Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
	3. Augment competency of instructors in critical thinking.	5. appraise characteristics and skills on critical thinking among instructors.	5. Score of characteristics and skills on critical thinking among instructors.	5. Examination on score of characteristics and skills on critical thinking among instructors.
		6. augmenting characteristics and skills on critical thinking among instructors.	6. Percentage of instructor augmented characteristics and skills on critical thinking among instructors.	6. Examination of instructor augmented characteristics and skills on critical thinking among instructors.
2. Provide and manage contributing factors to instructional design focused	4. Supportive environmental development for instructional design focused on critical thinking	7. developing technology and its network to support the production of media and activities for various	7.1 Number of computer for students. 7.2 Number of access point for wifi or LAN and high	7.1 Examination on number of computer for students. 7.2 Examination on number of access point for wifi or

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Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
on critical thinking enhancement.	enhancement.	instructional design.	speed internet in the institute.	LAN and high speed internet in the institute.
			7.3 Number of area in network system for instructor to product media technology for self-learning.	7.3 Examination on number of area in network system for instructor to product media technology for self-learning.
		8. develop building and space to facilitate self-directed learning and knowledge sharing.	8.1 Number of rooms for small group meeting	8.1 Examination on number of rooms for small group meeting
			8.2 Number of rooms with IT system and network for self-learning.	8.2 Examination on number of rooms with IT system and network for self-learning.

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Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
		9. Create educational media for critical thinking enhancement.	9.1 Number of educational medias for critical thinking enhancement.	9.1 Examination on number of educational medias for critical thinking enhancement.
			9.2 Number of educational medias for self-learning Enhancement.	9.2 Examination on number of educational medias for self-learning enhancement.
	4. Promote morale and encouragement for instructors to administer instructional design focused on critical thinking enhancement.	10. dealing with allocating budgets for instructional design activities for critical thinking enhancement.	10. Number of instructional design activities received budget to administer instructional design focused on critical thinking enhancement.	10. Examination on number of instructional design activities received budget to administer instructional design focused on critical thinking enhancement.

Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
3. Augment instructors' capacities on instructional design for critical thinking enhancement.	6. Developing instructors' capacities on instructional design for critical thinking enhancement.	11. improving instructors' knowledge and skills for administering instructional design activities for critical thinking enhancement.	11. Number of instructional design activities focused on critical thinking enhancement.	11. Examination on number of instructional design activities focused on critical thinking enhancement.
		12. promote knowledge sharing to enhance critical thinking among instructors.	12.1 Percentage of instructors participating in knowledge sharing to enhance critical thinking.	12.1 Examination and evaluation on instructors participating in knowledge sharing to enhance critical thinking.
			12.2 Level of instructors' satisfaction on	12.2 Evaluation on instructors' satisfaction

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Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
			participating in knowledge sharing to enhance critical thinking.	on participating in knowledge sharing to enhance critical thinking.
	7. Amplify the use of media and various technologies for critical thinking enhancement among instructors.	13. provide trainning workshops on the use of media and various technologies for critical thinking enhancement among instructors.	13.1 Percentage of instructors participating in training for using medias and various technology for critical thinking enhancement.	13.1 Examination and evaluation on instructors participating in training for using medias and various technology for critical thinking enhancement.
			13.2 Level of instructors' satisfaction on participating in training for using medias and various technology for	13.2 Evaluation on instructors' satisfaction on participating in training for using medias and various technology

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Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
			critical thinking enhancement.	for critical thinking.
4. Promote and strengthen nursing students' critical thinking development.	8. Integrating instructional design focused on critical thinking enhancement.	14. Integrate learning activities that promote–critical thinking.	14. Number of subjects integrating activities and instructional design focused on critical thinking enhancement.	14. Examination and evaluation on number of subjects integrating activities and instructional design focused on critical thinking Enhancement.
		15. Integrate nursing process and critical thinking into instructional design to enhance critical thinking.	15. Number of subjects integrating nursing process and instructional design focused on critical thinking enhancement.	15. Examination and evaluation on number of subjects integrating nursing process and instructional design focused on critical

Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
				thinking enhancement.
	9. Developing extracurricular activities for critical thinking enhancement.	16. Development projects/activities for critical thinking enhancement.	16. Number of projects/activities that enhance critical thinking.	16. Examination and evaluation on number of projects/activities that enhance critical thinking**.**
		17. Integrate students' development activities and critical thinking enhancement.	17. Number of projects/activities integrating student development activities and enhance critical thinking.	17. Examination and evaluation on number of projects/activities integrating student development activities and enhance critical thinking.
	10. Appraisal of characteristics and skills on critical thinking in nursing	18. Guideline development of appraisal of characteristics and	18. Number of appraisal activities of characteristics and	18. Examination and evaluation on number of appraisal activity of

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Table 4.21 (continued)

Strategy issue	Strategy	Measure	Indicator	Evaluation
	students.	skills on critical thinking in nursing students.	skills on critical thinking in nursing students.	characteristics and skills on critical thinking in nursing students.
		19. appraisal design of activities of characteristics and skills on critical thinking in nursing students.	19. Score of characteristics and skills on critical thinking in nursing students.	19. Evaluation on score of characteristics and skills on critical thinking in nursing students.

Part 2.4 Selection of strategy for implementation and psychometric properties evaluation of strategy evaluation instruments.

Researcher asked subjects in step 1 of Phase 2 who were instructors in public institutes in northern Thailand to select strategy for implementation. The details were as the followed:

1. Subjects considered guideline for selecting strategy to be implemented. The conclusion was that the strategy should relate to nursing practice because of its likelihood to examine the aspects of accuracy, propriety, feasibility and utility. Therefore, it could answer the question whether the developed strategy is able to practically enhance critical thinking because nursing students need to practice with patients and they have to integrate theory into practice thus their critical thinking can be investigated obviously.

2. Subjects selected strategy issues IV: Promoting and strengthening nursing students' development to become critical thinkers; strategy VIII: integrating instructional design focused on critical thinking enhancement; measurement XV : Integrate nursing process and critical thinking into instructional design to enhance critical thinking which nursing students used nursing process during nursing practice.

3. Researcher modified manual of instructional design for critical thinking enhancement. This manual identifies instructional model employing scaffolding and concept mapping in performing nursing process due to:

    3.1 The main principle of scaffolding is instructors promote nursing students to learn by their own way, employing the expertise of instructors and peer support. Instructors must stop to assist or provide assistance when consider that the students can learn on their own.

    3.2 Concept mapping is the method of self-learning for learners. Instructors provide opportunity for learners to related her/his knowledge systematically.

3.3 This strategy was reviewed to assure that it was able to develop student to become critical thinker and become lifelong learner which is appropriate for the 21st century instruction.

4. Subjects considered and recommended some refinements in the instruction manual. Researcher modified the manual as recommended.

5. Subjects and researcher considered the test of critical thinking skills for nursing students which created by Sripai Chaiya (B.E.2542). The reliability testing was conducted in the third year nursing students which had similar characteristics to the samples in this stage. The reliability was .78

6. All instruments in this stage, the test for case study analysis ~~by~~ using nursing process and satisfaction evaluation questionnaires on strategy for instructors and nursing students were refined.

7. Further phase was conducted after the completetion of instruments refinement.

Phase 3 The implementing results on selected critical thinking enhancement strategy for nursing students in state institutes.

Part 3.1 The results of implementation of the selected strategy

Researcher presented the results of implementation of the selected strategy on critical thinking enhancement in 3 parts as followed:

1. Scores of nursing process performance.
2. Nursing students' capacities on critical thinking skills.
3. Instructors and nursing students' satisfaction on the selected strategy.

Researcher implemented selected strategy in Adult and Elderly Nursing Practicum 1 during July, 22nd to September, 20th, 2013. Samples were 4 instructors and 31 nursing students which were selected by purposive sampling. The steps were as followed:

1. Informed coordinator of Adult and Elderly Nursing Practicum 1 for cooperation to implement the selected strategy. Researcher met with samples, 4 instructors and 31 nursing students, who were in the period of practice in this subject, and invited them to voluntarily participate in this study.

2. Systematically prepared instructors by organizing workshop on the process of instructional design with scaffolding and concept mapping and its implementation in the practicum course. The instructors were asked to follow manual of instructional design for critical thinking enhancement.

3. Prepared nursing students by informing them the detail of instruction design for practicing in this subject and reviewed and trained them how to do concept ampping. Nursing students were then asked to do the test of critical thinking skills before implementing the strategy.

Researcher modified the manual of instruction for Adult and Elderly Nursing Practice 1. Steps of instruction were 1) introduction, 2) teaching which was consisted of 2.1) cognitive conflict, 2.2) build up new knowledge, 2.3) confederate thinking, 2.4) scaffolding, 3) conclusion 4) doing concept maping. The samples, who were instructors, were asked to follow the instruction manual. The instructional design focused on the integration of scaffolding and concept mapping with nursing process. The evaluation of this study were done as followed:

1. **Scores of nursing process performance.**

   After finishing the implementation, the nursing students were asked to take a test for analyzing situation of case study by using nursing procee. The detail of score was as followed:

Table 4.22 Score of nursing students for analyzing situation from case study with the application of nursing process.

Score of analysis	number	percentage
1 – 10	1	3.23
11 – 20	2	6.45
21 – 30	18	58.06
31 – 40	10	32.26
Average	27.73 (± 6.092)	

From Table 4.22 The highest score of analyzing situation from case study with the application of nursing process was 21-30 (58.06%). The average of score were 27.73 ± 6.092.

2. **Nursing students' capacities of critical thinking skills.**

   After implementation of the strategy, nursing students were asked to do the test of critical thinking skills. Researcher compared scores before and after implementation of the strategy using t test. The result was as followed:

Table 4.23 Scores of critical thinking skills before and after the implementation of selected strategy

Score of critical thinking skills	N	min	max	$\bar{X}$	SD	t	p value
After implementation	31	48	76	56.13	5.321	12.138	.000
Before implementation	31	39	53	48.13	4.759		

From Table 4.23: The average scores of critical thinking skills after implementation (56.13 ± 5.321) was statistically significantly higher than that of before implementation (48.13 ± 4.759) ($t = 12.138$; p = .000).

Table 4.24 Levels of nursing students' ability in critical thinking skills before and after implementation by number and percentage.

Levels of ablility in critical thinking skills	after total (%)	before total (%)	χ^2	α
High ability	9 (29.03)	7 (22.58)	15.750*	.203
Moderate ablity	14 (45.16)	12 (38.71)	20.533*	.152
Low ability	8 (25.81)	12 (38.71)	20.667*	.192

* $\alpha > .5$

From table 4.24: After the strategy implementation it was found that the highest percentage (45.16%) of nursing students was in moderate level of critical thinking skills, while before the implementation the highest percentage was equally in moderate and low levels (38.71%) of critical thinking skills. Nursing students' ablility at each level of critical thinking skills after and before implementation were statistically significantly different ($\chi^2_= $ 15.750, 20.533, 20.667; α=.203,.152,.192 , respectively).

Table 4.25 Critical thinking skills scores after and before
implementation of the strategy by each aspect.

Scores of critical thinking skills	After		Before		t	p value
	$\overline{X}$	SD	$\overline{X}$	SD		
Inference	9.06	2.097	6.74	2.081	9.400	.000
Recognition of Assumptions	11.97	2.510	10.00	2.633	8.575	.000
Deduction	12.68	1.681	10.26	1.825	9.404	.000
Interpretation	12.06	1.504	11.97	1.941	.234	.816
Evaluation of Arguments	10.45	2.219	8.97	2.025	3.494	.002

From Table 4.25: Scores of critical thinking skills after and before the strategy implementation in the aspects of Inference, Recognition of assumptions, Deduction, and Evaluation of arguments were statistically significantly different (t = 9.400, 8.575, 9.404 and 3.494; p =.000, .000, .000 and .002, respectively). Meanwhile, scores of critical thinking skills after and before the strategy implementation in the aspect of interpretation was not different (t =.234; p = .816).

3. Instructors and nursing students' satisfaction of the selected strategy.

   3.1 Satisfaction of instructors.

Regarding implementation of the strategy: integrating instructional design focused on critical thinking enhancement; measurement XV: Integrate nursing process and critical thinking into instructional design to enhance critical thinking. Researcher employed 'scaffolding' and 'concept mapping' for instructional design in this study. After implementation, researcher evaluated satisfaction of the strategy through group discussion among instructors. The details were as followed:

   3.1.1 The opinion about Scaffolding.

   1) It was a good instructional design. At first, it was not smooth because it was a new technique for instructors. After using scaffolding for a few days, instructors could monitor cognitive knowledge of students .They said:

   'At first, we were not confident whether or not students could understand this instructional design. Instructors were not keen at this method.When enough time has passed there was a positive impact on nursing students, they were able to think reasonably'

   'At the first, no confidence, when the methods were adopted, both instructors and students were able to do better'

   2) It was a good instrument for instruction. It could promote potential and develop learning process of students.

   'This technique can help students to become active learners. Students can relate the thoughts from the past, which is often overlooked'

   3.1.2 Promote nursing students to think systematically

   1) Nursing students can think more systematically.

   'Compare to students in the past and their learning practice,

they could think more systematically, they knew how to plan for nursing practice'

2) Enthusiasm in searching for findings to answer the question

'When they could not find the correct answer, theoy would ask for further searching and would come back to tell the answer in the next day. They looked happy to be able to search for further information'

3) To link concepts and conduct concept mapping by designed symbols to increase understanding and memory

'As I see, they could start to explain, they could begin to link their thoughts and design symbols to make it easy to understand'

3.1.3 Allowing peer to help each other to answer questions

1) Create an atmosphere of learning

'I use questions with open end and challenge them to search for answer. Students worked together to search for answer, then they came back for answering'.

'At first, they were afraid to help each other to answer. When I allowed them to help each other, some of them explained pathology, some of them explain disease, so they can relate their knowledge, like they played jigsaw, then they get a complete picture'

2) Enhance characteristic of active learners

'Students said that they would search further information when they learned in classroom and could not understand clearly'

3.1.4 Enhance understanding on nursing process by the use of concept mapping

1) Promote and develop learning process. Nusring students thought and link knowledge systematically.

'I never thought that they would embed their idea in their mind. And over time, when we discuss, they showed that they could think more critically and covered issues better than earlier.'

'They look after patients holistically, covered all aspects'

   2) Use as guideline to frame concepts

   'Students understood nursing process much better, they could analyze patient's problems, quite better'

   'They could imagine their thought and relate to patients' problems, causes of problem, and provide guideline for nursing care. They could do concept mapping. Anyway, sometimes, it was incorrect because they did not have enough information'

   3.1.5 Satisfaction on instructional design

   Two samples rated 10, one sample rated 9 and the other one rated 8 from the total score of 10. The average score of their satisfaction was 9.25

3.2 Satisfaction of nursing students

The satisfaction evaluation form for nursing student was questionnaire with open-ended questions. Researcher analzed and categorized the answer. The detail was as followed:

Table 4.26 Nursing student's satisfaction on instruction design with scaffolding and concept mapping.

Opinion*	Total	percentage
Feeling when instructors asked for answering.		
Being stimulated to think and gain knowledge.	26	83.87
Fear of not being able to answer.	11	35.48
Excited, fear to be blamed by instructors.	10	32.26
Being enthusiastic.	7	22.58
Have opportunity to assess their own knowledge.	5	16.13
Feel uncomfortable when cannot answer.	3	9.68

Table 4.26 (continued)

Opinion	Total	percentage
Feeling when they are able to answer instructor's question.		
Have opportunity to assess their own knowledge.	30	96.77
Feeling proud of themselves.	11	35.48
Feel encouraged.	8	25.81
Feeling when they are not able to answer instructor's question.		
Needs to search for additional knowledge.	26	83.87
Doing self assessment and realize they do not have enough knowledge.	12	38.71
Being disappointed in self.	8	25.81
Being anxious and stressful.	3	9.68
Feeling when instructors allowed peers to help answering questions.		
Prefer to have friends to help.	30	96.77
Feeling supported from friends to help find correct answer.	7	22.58
Stimulate student to think.	7	22.58
Mutual exchange of knowledge.	7	22.58
Encourages students to participate.	7	22.58
Recognize their own weaknesses.	3	9.68
Feeling when friends teach each other.		
Benefitial.	29	93.55
Having different levels of knowledge.	18	62.07
Feeling confident to discuss.	12	41.38
Most students help each other though sometimes. additional knowledge was needed.	8	27.59
Friends have more knowledge.	6	20.69
Feeling like talking with friends.	3	10.34

Table 4.26 (continued)

Opinion	Total	percentage
Not benefitial.	2	6.45
Knowledge is not different among each other.	2	100.00
Assignment to do concept mapping.		
Practicing to think systematically.	23	74.19
Being able to link knowledge to give better care for patients.	18	58.06
Promote better memory.	14	45.16
Better understanding the care for patients.	12	38.71
Average score of satisfaction on instructional design = 9.15		

* answer > 1 in each item

From Table 4.26: When instructors asked question, most of subjects (83.87%) felt that it stimulted their thoughts and knowledge. 96.77% realized that answering correctly helped them to assess their knowledge. Meanwhile, when their answers were not correct, they thought that they needed to search for additional knowledge (83.87%). and 96.77% of subjects liked it when they were allowed to teach each other. Moreover, 93.55% of subjects stated that allowance students to teach each other helped increase knowledge because they had different basic knowledge. Regarding assignment to do concept mapping, 74.19% of subjects thought that this method helped them to think more systematically. They concluded that their satisfaction on this instructional design was 9.15 from total score of 10.

Part 3.2 Conclusion on critical thinking enhancement strategy for nursing
students in state institutes.

This development of strategy to enhance critical thinking for nursing students employed research and development method. The steps were created questionaires to assess current situation and expectation of critical thinking enhancement in public institutes. The derived information led to drafting the preliminary strategy to enhance critical thinking for nursing students using SWOT analysis technique. Experts were asked to evaluate the preliminary strategy. Researcher refined the strategy as recommended by experts and concluded the strategy to enhance critical thinking for nursing students in public institutes which was consisted of:

1. **Vision**

    Nursing students demonstrate characteristics and skills on critical thinking.

2. **Mission**

    1. Provision of instructional design management focused on critical thinking enhancement.
    2. Provision and management of contributing factors to instructional design focused on critical thinking enhancement.
    3. Augmentation of instructors' capacities on instructional design focused on critical thinking enhancement.
    4. Promotion and reinforcement of nursing students' development to become critical thinkers.

3. **Goals**

    1. Manage instructional design focused on critical thinking enhancement.
    2. Provide contributing factors to instructional design focused on critical thinking enhancement.
    3. Instructor is able to design instruction focused on critical thinking enhancement.
    4. Develop nursing students to become critical thinkers.

4. **Strategy issues** :

   Strategy issue 1: Instructional design management focused on critical thinking enhancement.

   Strategy 1: Increase participation in policy setting in instructional design focused on critical thinking enhancement.

   Measure 1: assigning instructors to participate in policy setting on instructional design focused on critical thinking Enhancement.

   Indicator 1.1: Number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.

   Indicator 1.2: Policy on instructional design focused on critical thinking enhancement.

   Measurement and criteria for evaluation 1.1: Examinination on number of instructor participating in policy setting on instructional design focused on critical thinking enhancement.

   Measurement and criteria evaluation 1.2: Examinination and evaluation of policy on instructional design focused on critical thinking enhancement.

   Measure 2: identifying guideline on management of instructional design focused on critical thinking enhancement.

   Indicator 2: Provide guideline on management for instructional design focused on critical.

   Measurement and criteria for evaluation 2: Evaluation quality of guideline on management as policy for instructional design.

Strategy 2: Promote recognition and positive attitude on management of instructional design focused on critical thinking enhancement.

Measure 3: increasing recognition and positive attitude on management of instructional design focused on critical thinking enhancement for instructors.

Indicator 3: Number of instructor to embed positive attitude on management of instructional design focused on critical thinking enhancement.

Measurement and criteria for evaluation 3: Examination on instructor embeded positive attitude on management of instructional design focused on critical thinking enhancement.

Measure 4: regulating terms of reference (TOR) for instructors to instructional design focused on critical thinking enhancement.

Indicator 4: Acknowledgement of designation in terms of reference for instructors to design instruction focused on critical thinking enhancement.

Measurement and criteria evaluation 4: Designation in terms of reference for instructors to design instruction focused on critical thinking enhancement.

Strategy 3: Augment competency of instructors in critical thinking.

Measure 5: appraise characteristics and skills on critical thinking among instructors.

Indicator 5: Score of characteristics and skills on critical thinking among instructors.

Measurement and criteria evaluation 5: Examination on score of characteristics and skills

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on critical thinking among instructors.

Measure 6: augmenting characteristics and skills on critical thinking among instructors.

Indicator 6: Percentage of instructor augmented characteristics and skills on critical thinking among instructors.

Measurement and criteria evaluation 6:
Examination of instructor augmented characteristics and skills on critical thinking among instructors.

Strategy issue 2: Provide and manage contributing factors to instructional design focused on critical thinking enhancement.

Strategy 4: Supportive environmental development for instructional design focused on critical thinking enhancement.

Measure 7 : developing technology and its network to support the production of media and activities for various instructional design.

Indicator 7.1: Number of computer for students.
Indicator 7.2: Number of access point for wifi or LAN and high speed internet in the institute.

Indicator 7.3: Number of area in network system for instructor to product media technology for self-learning.

Measurement and criteria evaluation 7.1:
Examination on number of computer for students.
Measurement and criteria evaluation 7.2:
Examination on number of access point for wifi or LAN and high speed internet in the institute.

Measurement and criteria evaluation 7.3:
Examination on number of area in network system for instructor to product media technology for self-

learning.

Measure 8 : Develop building and space to facilitate self-directed learning and knowledge sharing.

Indicator 8.1: Number of rooms for small group meeting.

Indicator 8.2: Number of rooms with IT system and network for self-learning**.**

Measurement and criteria evaluation 8.1: Examination on number of rooms for small group Meeting.

Measurement and criteria evaluation 8.2: Examination on number of rooms with IT system and network for self-learning.

Measure 9 : Create educational media for critical thinking enhancement.

Indicator 9.1: Number of educational medias for critical thinking enhancement.

Indicator 9.2: Examination on number of educational medias for critical thinking enhancement.

Measurement and criteria evaluation 9.1: Number of educational medias for self-learning enhancement.

Measurement and criteria evaluation 9.2: Examination on number of educational medias for self-learning enhancement.

Strategy 5: Promote morale and encouragement for instructors to administer instructional design focused on critical thinking enhancement.

Measure 10 : dealing with allocating budgets for instructional

design activities for critical thinking enhancement.

Indicator 10: Number of instructional design activities received supporting budget to administer instructional design focused on critical thinking enhancement.

Measurement and criteria evaluation 10: Examination on number of instructional design activities received supporting budget to administer instructional design focused on critical thinking enhancement.

Strategy issue 3: Augment instructors' capacities on instructional design for critical thinking enhancement.

Strategy 6: : developing instructors' capacities on instructional design for critical thinking enhancement.

Measure 11: improving instructors' knowledge and skills for administering instructional design activities for critical thinking enhancement.

Indicator 11: Number of instructional design activities focused on critical thinking enhancement.

Measurement and criteria evaluation 11: Examination on number of instructional design activities focused on critical thinking enhancement.

Measure 12: promote knowledge sharing to enhance critical thinking among instructors.

Indicator 12.1: Percentage of instructors participating in knowledge sharing to enhance critical thinking.

Indicator 12.2: Level of instructors' satisfaction on participating in knowledge sharing to enhance critical thinking.

Measurement and criteria evaluation 12.1: Examination and evaluation on instructors participating in knowledge sharing to enhance critical thinking.

Measurement and criteria evaluation 12.2: Evaluation on instructors' satisfaction on participating in knowledge sharing to enhance critical thinking.

Strategy 7: Amplify the use of media and various technologies for critical thinking enhancement among instructors.

Measure 13: provide trainning workshops on the use of media and various technologies for critical thinking enhancement among instructors.

Indicator 13.1: Percentage of instructors participating in training for using medias and various technology for critical thinking enhancement.

Indicator 13.2: Level of instructors' satisfaction on participating in training for using medias and various technology for critical thinking enhancement.

Measurement and criteria evaluation 13.1: Examination and evaluation on instructors participating in training for using medias and various technology for critical thinking enhancement.

Measurement and criteria evaluation 13.2: Evaluation on instructors' satisfaction on participating in training for using medias and various technology for critical thinking.

Strategy issue 4: Promote and strengthen nursing students' critical thinking development.

Strategy 8: Integrating instructional design focused on critical thinking enhancement.

Measure 14: Integrate learning activities that promote–critical thinking.

Indicator 14: Number of subjects integrating activities and instructional design focused on critical thinking enhancement.

Measurement and criteria evaluation 14 : Examination and evaluation on number of subjects integrating activities and instructional design focused on critical thinking enhancement.

Measure 15: Integrate nursing process and critical thinking into instructional design to enhance critical thinking.

Indicator 15: Number of subjects integrating nursing process and instructional design focused on critical thinking enhancement.

Measurement and criteria evaluation 15 : Examination and evaluation on number of subjects integrating nursing process and instructional design focused on critical thinking enhancement.

Strategy 9: Developing extracurricular activities for critical thinking enhancement.

Measure 16: Development projects/activities for critical thinking enhancement.

Indicator 16: Number of projects/activities that enhance critical thinking.

Measurement and criteria evaluation 16 : Examination and evaluation on number of projects/activities that enhance critical thinking.

Measure 17: Integrate students' development activities and critical thinking enhancement.

> **Indicator 17:** Number of projects/activities integrating student development activities and enhance critical thinking.

> > **Measurement and criteria evaluation 17 :** Examination and evaluation on projects/activities integrating student development activities and enhance critical thinking.

Strategy 10: Appraisal of characteristics and skills on critical thinking in nursing students.

> **Measure 18:** Guideline development of appraisal of characteristics and skills on critical thinking in nursing students.

> > **Indicator 18:** Number of appraisal activities of characteristics and skills on critical thinking in nursing students.

> > > **Measurement and criteria evaluation 18 :** Examination and evaluation on number of appraisal activities of characteristics and skills on critical thinking in nursing students.

> **Measure 19:** appraisal design of activities of characteristics and skills on critical thinking in nursing students.

> > **Indicator 19:** Score of characteristics and skills on critical thinking in nursing students.

> > **Measurement and criteria evaluation 19 :** Evaluation on score of characteristics and skills on critical thinking in nursing students.