Chapter 4

Results of the study

This research aimed to construct a learner-centered training course to develop learners' thinking skills and to examine learners' thinking skills before and after applying the learner-centered training course. Data were collected and analyzed according to the design below:

1) Students' background collected by using questionnaire and interview
2) Teachers' background collected by using questionnaire and interview
3) Analysis of lesson plans before and after the implementation of the training course
4) Learners' thinking skills
5) Conclusion

1. Students background

The information about students' background was collected by means of students' questionnaire and interview which were administrated before the implementation of the learner-centered training course. Data were analyzed and classified into 7 topics, namely: 1) students' opinions on English learning background, 2) students' beliefs in their English proficiency, 3) students' beliefs and opinions about teachers' roles, 4) students' beliefs in English language learning, 5) students' beliefs in learning goals, 6) students' beliefs in learning strategies, and 7) students' thinking skills used before the implementation of the training course.

The information collected was used in designing the learner-centered training course so that the curriculum of the course corresponded to and fulfilled students' needs, background and interests.

1.1 Students' opinions on English learning background

Before implementing the training course, this group of students was taught for one semester in order to gain observation of the learning environment and to learn their needs and behaviors.

A survey of the students' background on personal information revealed that the sample group which showed that they were 12-14 years of age, consisted of 19 male and10 female students. On the students' opinions on English learning background, results are shown in Table 3.

Table 3. Students' opinions on English learning background

Questions	Answers	Percentage	Frequency
How do you rate your motivation in learning English?	Highly motivated	17.24	5
	Well motivated	75.86	22
	Slightly motivated	3.45	1
	Not motivated	3.45	1
How do you rate your overall English proficiency?	Excellent	3.45	1
	Good	27.59	8
	Fair	37.93	11
	Poor	34.48	10
How important is it for you to be proficient in English language learning?	Very important	41.38	12
	Important	62.07	18
	Not so important	0	0
	Not important	0	0
How do you feel when studying in English classes?	Happy	48.28	19
	Worried	41.38	12
	Scared	3.45	1
	Others	10.34	3

According to the data resulting from the questionnaire, the students were well motivated in learning English (75.86%) and had rated their English proficiency at fair level (37.93%). The students also acknowledged the importance of being proficient in English language (62.07%) including having a good attitude in learning English, feeling happy when attending English classes (48.28%).

It could be seen that students had good attitude in learning English and were happy when they attended English classes even though they rated their English ability at the average level.

1.2 Students' beliefs in their English proficiency

Part two of questionnaire was designed to investigate students' English proficiency on how well students consider their English ability. Table 4 shows students' beliefs in their English proficiency.

Table 4. Students' beliefs in their proficiency

Item	Questions	Mean Score	Interpretation (Level of language ability)
1.	How much do you know English?	2.86	Average
2.	Could you tell me how well you know this language?	2.66	Average
3.	Do you consider yourself to be a gifted language learner?	2.72	Average
4.	Do you consider yourself to be an assertive person in learning English?	2.97	Average
	Total	**2.8**	Average

Students rated their level of English knowledge at an average level and also considered themselves as average gifted and assertive learners. Total mean score of students' beliefs in their English proficiency was 2.8.

1.3 Students' beliefs and opinions about teacher's roles

This part of the questionnaire was designed to observe students' beliefs and opinions about teacher's role in their English classes.

Table 5. Students' beliefs and opinions on teacher's roles

Item	Questions	Mean	Interpretation (Level of importance)
1.	In English language learning, I believe that teacher needs to tell me what to do.	3.62	Agree
2.	In English language learning, I believe that the teacher needs to help me learn effectively.	3.66	Agree
3.	In English language learning, I believe that the teacher needs to explain why we are doing an activity.	3.93	Agree
4.	In English language learning, I believe that the teacher needs to give me regular tests.	3.41	Agree
5.	In English language learning, I believe that the teacher needs to offer help.	3.59	Agree
	Total	**3.64**	**Agree**

In Table 5, it is shown that students agreed that the roles of the teacher were important in their classes. Students believed that the teachers need to tell them what to do, to help them learn effectively, to tell them the learning objectives, to evaluate them and to provide them with a solution to any problem they encounter in class.

Generally, teachers take roles in teaching and learning and students believed that the roles of their teachers also affected their learning.

1.4 Students' beliefs in English language learning

This part of questionnaire was designed to observe students' beliefs in English language learning.

Table 6. Students' beliefs in English language learning

Item	Questions	Mean	Interpretation (Frequency of usage)
1.	In English language learning, I can communicate in English without knowing the rules.	2.37	Occasionally
2.	In English language learning, I know how to find an effective way to learn English.	2.93	Sometimes
3.	In English language learning, I know how to correct mistakes in my work.	2.79	Sometimes
4.	In English language learning, I am above average at language learning.	2.41	Occasionally
5.	In English language learning, I know best how well I am learning.	2.76	Sometimes
	Total	2.65	Sometimes

From Table 6, it is shown that students occasionally believed that they were above average at language learning and could communicate in English without knowing the rules. Also, students knew how to find sometimes an effective way to learn English, how to correct mistakes in their work and knew how to learn best.

1.5 Students' beliefs in learning goals

Table 7. Students' beliefs in learning goals

Item	Questions	Mean	Interpretation (Level of importance)
1.	I am willing to set my own goal.	3.79	Agree
2.	I choose the content I need to learn.	3.28	Agree
3.	I select methods and techniques for my own learning.	3.17	Agree
4.	I check my work for mistakes.	2.97	Not sure
5.	I ask for help when I need it.	3.76	Agree
	Total	3.39	Agree

Table 7 shows students' beliefs in learning goals and results revealed that students agreed with setting their own goals, choosing their own content, selecting their own methods and techniques, and asking for help when they considered it of importance. But data also showed that students were not sure that checking their own mistakes was also important.

1.6 Students' beliefs in learning strategies

This part of questionnaire was designed to observe students' beliefs in language learning strategies and how often students used their learning strategies while they were learning English.

Table 8. Students' beliefs in language learning strategies in English learning

Item	Questions	Mean	Interpretation (Frequency of usage)
1.	When learning a new language, I learn by listening, talking to others and trying things out by communicating them through before doing them.	2.48	Occasionally
2.	When learning a new language, I learn by doing, by manipulating things. I like 'hands-on' experience.	3.52	Often
3.	When I get an assignment, I ask for an explanation.	3.07	Sometimes
4.	When I have learned some new expressions in foreign language, I try to use them in real life.	3.31	Sometimes
5.	When I get comments from my work, I use comments from teacher to improve my work.	3.66	Often
6.	Do I listen to the radio or watch films or TV in a foreign language?	2.79	Sometimes
	Total	**3.13**	**Sometimes**

Students considered using learning strategies in English language study and often learned a new language by doing, by manipulating things and by using comments from the teachers to improve their work. Sometimes, students had to ask for explanations in doing their assignments. However, they also use the new knowledge in applying to the real life situations, listening to radio and watching TV in English.

1.7 Students' thinking skills used before the implementation of training course

The thinking skills of the students were also investigated before they were trained and as previously stated, consisted of three main thinking skills: analytical thinking; creative thinking; and, practical thinking. Results from the questionnaire are presented in the table below.

Table 9. Means of overall students' thinking skills before the implementation of training course based from the questionnaire

Item	Thinking skills	Mean	SD	Interpretation (Frequency of usage)
1.	Analytical thinking	3.40	.10862	Sometimes
2.	Creative thinking	3.37	.50766	Sometimes
3.	Practical thinking	3.25	.17035	Sometimes

Table 9 shows that before the training course, the students sometimes used their analytical, creative, and practical thinking skills in their learning.

When considering sub-skills of analytical thinking, namely: analysis, synthesis and evaluation, results are presented in the table below.

Table 10. Means of students' analytical thinking skills before the implementation of training course based on the questionnaire

Item	Analytical thinking skills	Mean	SD	Interpretation (Frequency of usage)
1.	Analysis	3.38	.1979	Sometimes
2.	Synthesis	3.52	.1202	Often
3.	Evaluation	3.24	.1697	Sometimes

Table 10 shows that students often used synthesis but sometimes used analysis and evaluation thinking skills before the training course. Results from detailed examination of the sub-skills of creative thinking (fluency, flexibility, originality and elaboration) are presented in the table below.

Table 11. Means of students' creative thinking skills before the implementation of training course based on the questionnaire

Item	Creative thinking skills	Mean	SD	Interpretation (Frequency of usage)
1.	Fluency	3.18	1.0553	Sometimes
2.	Flexibility	3.59	.8717	Often
3.	Originality	3.25	.9112	Sometimes
4.	Elaboration	3.62	1.0592	Often

Table 11 shows that students often used flexibility and elaboration but sometimes used fluency and originality thinking skills.

Results of detailed examination on the investigation of sub-skills of practical thinking (application and adaptation), are presented in the table below.

Table 12. Means of students' practical thinking skills before the implementation of training course based on the questionnaire

Item	Practical thinking skills	Mean	SD	Interpretation (Frequency of usage)
1.	Application	3.31	.0989	Sometimes
2.	Adaptation	3.00	.1202	Sometimes

Table 12 shows that students sometimes used application and adaptation thinking skills in their English learning.

1.8 Interview of students

From the interviews, students showed that they required practicing autonomous learning and preferred learning by doing, as applied in the training course of this study. Based on the results from questionnaires and interviews, it can be concluded

that students become the center of the class and teachers usually took roles in the preparation of teaching materials.

2. Teachers' background

Data revealed that English teachers in the school have more than 10 years experience in teaching English in the secondary level education.

In this study, the teachers handled English language courses in secondary level education from Mattayom Suksa 1-Mattayom Suksa 3 (grade 7-9). A questionnaire was given to the teachers to investigate about their beliefs in their roles, in the nature of language learning and in thinking skills, namely: analytical, creative and practical thinking skills.

2.1 Teachers' beliefs in teachers' roles

The first part of teacher questionnaire was about the beliefs of teachers in their roles. Analysis of data is presented in Table 13.

Table 13. Teachers' beliefs in teachers' roles

Item	Teacher roles	Questions	Mean	Interpretation (Level of importance)
1.	Setting goals and plan	I believe that the teacher needs to set students' learning goals.	5.00	Highly agree
2.		I believe that the teacher needs to help students learn effectively.	5.00	Highly agree
3.		I believe that the teacher needs to decide how long students should spend on activities.	4.5	Highly agree
4.	Telling students what to do and their progression	I believe that the teacher needs to tell students what progress they are making.	4.00	Agree
5.		I believe that the teacher needs to tell students what to do.	4.00	Agree
6.		I believe that the teacher needs to explain why they are doing an activity.	4.00	Agree
7.		I believe that the teacher needs to tell students what their difficulties are.	4.00	Agree
8.	Finding opportunities for students' learning	I believe that the teacher needs to create opportunities for students to practice.	5.00	Highly agree
9.		I believe that the teacher needs to give students regular tests.	4.00	Agree
10.		I believe that the teacher needs to offer help to students.	4.00	Agree
		Total	**4.35**	**Highly agree**

As shown in Table 13, the study revealed that teachers strongly believed about the importance of their roles in class especially in setting the goals of learning. They also strongly believed that telling students about their progress and finding opportunities for them to learn were important. The teachers themselves had high expectation in their roles in the English classrooms. The frequency of importance of teachers' beliefs in their roles in teaching English was at very high level.

2.2 Teachers' beliefs in the nature of language learning

One factor which could affect students' language development is teachers' perspectives on the nature of language learning. Teachers should teach in different styles according to their beliefs in nature of language learning. The following table shows teachers' beliefs in the nature of language learning with focus on attitude and process of language learning.

Table 14. Teachers' beliefs in the nature of language learning

Item	The nature of language learning	Questions	Mean score	Interpretation (Level of importance)
1.	Attitude in language learning	All people learn language in the same way.	1.00	Highly disagree
2.		Making mistakes is harmful in language learning.	1.00	Highly disagree
3.		It is possible to learn a language in a short time.	2.00	Disagree
4.		Having my work evaluated by others is scary.	2.00	Disagree
Total			1.5	**Highly disagree**
Item	The nature of language learning	Questions	Mean score	Interpretation (Level of importance)
5.	Process of language learning	Language learning takes a long time.	3.5	Agree
6.		Different people learn language in different ways.	5.00	Highly agree
7.		Making mistakes is a nature part of learning.	4.5	Highly agree
8.		Having my work evaluated by others is helpful.	4.5	Highly agree
Total			4.37	**Highly agree**

Table 14 shows that teachers had good perspectives on the nature of language learning. The first part of the survey focused on the attitude of language learning in people. The teachers believed that people would not be able to learn language in the same way and they also believed that making mistakes was not harmful in learning language, that it was impossible to learn a language in a short time and being evaluated by others was not scary in language learning. On the other hand, the second part of the survey on nature of language learning focused on the process of language learning. It was shown that teachers believed people learned a language in different ways and that in learning a language, it took a long time to develop the language skills but making mistakes and doing evaluations of other people were helpful for people in language learning.

From Tables 13 and 14, it can be concluded that although the teachers believed the teacher-centered methodology in teaching English is necessary, they had an open mind to create adaptations toward student-centered and other methodologies in teaching English.

2.3 Teachers' beliefs in thinking skills

The third part of questionnaire investigated teachers' beliefs in thinking skills especially analytical, creative and practical thinking skills. Analytical thinking is classified into analysis, synthesis and evaluation. Creative thinking is divided into fluency, flexibility, originality and elaboration while practical thinking is categorized into application and adaptation.

Part 1. Analytical thinking

The first part of the questionnaire dealt with analytical thinking. The questions were designed to investigate teachers' beliefs in three sub-skills of analytical thinking, namely, analysis, synthesis and evaluation. The findings of investigation are presented in Table 15.

Table 15. Teachers' beliefs in analytical thinking

Item	Questions	Analytical thinking sub-skills	Mean score	Interpretation (Level of importance)
1.	I enjoy students analyzing, grading or comparing things.	Analysis	4.5	Highly agree
2.	When deciding, I like students to compare the opposing viewpoints.	Analysis	4.00	Agree
3.	When discussing or writing, I like students criticizing others' ways.	Analysis	4.00	Agree
Total mean score of analysis skill			**4.16**	**Agree**
4.	I like students to learn to compare and rate different ways of doing things.	Synthesis	4.5	Highly agree
5.	I like students to study and rate different views and ideas.	Synthesis	4.5	Highly agree
Total mean score of synthesis skill			**4.5**	**Highly agree**
6.	I prefer students to grade the design or method of others.	Evaluation	4.5	Highly agree
7.	I like students to check and rate opposing points of views.	Evaluation	4.00	Agree
Total mean score of evaluation skill			**4.25**	**Highly agree**
Total mean score of analytical thinking			***4.28***	***Highly agree***

Table 15 shows that teachers had strong belief that among the analytical thinking sub-skills, synthesis and evaluation were more important than analysis which was also just important.

Part 2. Creative thinking

The second part of the questionnaire dealt with creative thinking skill. The questions were designed to investigate three sub-skills of creative thinking, namely, fluency, flexibility, originality and elaboration and the results of which are presented in Table 16.

Table 16. Teachers' beliefs in creative thinking

Item	Questions	Creative thinking sub-skills	Mean score	Interpretation (Level of importance)
1.	I like situations where students can use their own ideas and ways.	Fluency	4.5	Highly agree
	Total mean score of fluency skill		**4.5**	**Highly agree**
2.	I like students to play with their ideas and see how far they go.	Flexibility	5.00	Highly agree
3.	I like problems where students can try their own way of solving.	Flexibility	4.5	Highly agree
	Total mean score of flexibility		**4.75**	**Highly agree**
4.	When working on a task, I like students to start with their own ideas.	Originality	4.5	Highly agree
5.	I like students to use their own ideas and strategies to solve problems.	Originality	4.00	Agree
	Total mean score of originality skill		**4.25**	**Highly agree**
6.	I feel happier about a job when students can decide for themselves.	Elaboration	5.00	Highly agree
7.	With opposing ideas, I like students to decide which is right.	Elaboration	4.5	Highly agree
	Total mean score of elaboration skill		**4.75**	**Highly agree**
	Total mean score of creative thinking		***4.57***	***Highly agree***

From Table 16, data showed that teachers strongly believed that the sub-skills of creative thinking (fluency, flexibility, originality and elaboration), were considered very important for students.

Part 3 Practical thinking

For the practical thinking skill, questions were designed to investigate two sub-skills, namely, application and adaptation.

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Table 17. Teachers' beliefs in practical thinking

Item	Questions	Practical thinking sub-skills	Mean score	Interpretation (Level of importance)
1.	I check on students to see what method or procedure they should use.	Application	4.5	Highly agree
2.	I am careful to allow students to use the proper method to solve problems.	Application	4.5	Highly agree
3.	I like students to solve a problem by following certain rules.	Application	4.5	Highly agree
4.	I enjoy working on things that students can do by following directions.	Application	4.00	Agree
Total mean score of application skill			**4.37**	**Highly agree**
5.	I like projects with clear structure and set plan and goal.	Adaptation	5.00	Highly agree
6.	I like situations in which students' role is clearly defined.	Adaptation	4.5	Highly agree
7.	I like students to follow definite rules or directions.	Adaptation	4.00	Agree
8.	When discussing or writing, I like students to figure out for themselves how they will work.	Adaptation	4.00	Agree
Total mean score of adaptation skill			**4.37**	**Highly agree**
Total			*4.37*	*Highly agree*

From Table 17, it can be seen that teachers strongly believed that practical thinking was very important. Application and adaptation, which are sub-skills of practical thinking, were also very important for students.

2.4 Results of teachers' interviews

After teachers completed the questionnaires, they were then interviewed. The two teachers involved in the interview taught English in the secondary school and from the interviews, insights and information about their beliefs and opinions of their roles were collected. Results showed that teachers were the ones who prepared the learning materials and activities for students to participate in the classrooms and who evaluated their learning performances. While the students became the center of the class, the teachers needed to only give guidance to the students. Teachers believed that autonomous learning was very important especially concerning modern issues such as globalization and information technology, which the students needed to know through becoming self-directed learners. For the teaching materials, the teachers believed that a variety of teaching materials could help the students to become good language learners and helping them understand the language more easily. Moreover, the teachers believed that giving assignments to students would train and develop them to become autonomous learners while allowing them to enjoy and be willing to learn English.

3. Analysis of lesson plans before and after the implementation of the training course

Objective 1: To construct a training course for developing learners' thinking skills.

Based on the information collected from the questionnaire and interviews of students and teachers, the curriculum of the training course was designed and constructed using learner-centered teaching approach.

Consisting of 4 units, namely, pen friends, travel, entertainment, and traditions, the training course included 28 lesson plans, which covered a total of 28 hours.

The curriculum of a training course was composed of 28 lesson plans and was evaluated by two experts to ensure the validity and reliability of the curriculum. The evaluation of the curriculum was based on (1) learning goals and objectives, (2) lesson procedures, (3) teaching assessment, (4) instructional procedures and strategies, (5) teaching materials, and (6) class organization.

The passing criterion was 3.51 from 5 scales. During evaluation, the lesson plans were revised when the mean score of each part in the lesson was below 3.51 from scale of 5. Results of the passing criterion of lesson plans are presented in the table below.

3.1 Evaluation of lesson plans by experts

Table 18. Overall evaluations of lesson plans by experts

Item	Category	Mean	Interpretation
1.	Learning goals and objectives	4.2	Good
2.	Lesson procedures	4.19	Good
3.	Teaching assessment	4.28	Excellent
4.	Instructional procedures and strategies	4.18	Good
5.	Teaching materials	4.14	Good
6.	Class organization	3.98	Good
	Total	4.16	Good

Evaluation results indicated that all unit plans were able to meet the criteria. The mean scores of all categories (items 1-6) were 4.2, 4.19, 4.28, 4.18, 4.14, and 3.98, respectively. Thus it can be said that the training curriculum was considered good and met the passing criterion because the total mean score of curriculum evaluated by the experts was 4.16.

According to the comments of the experts especially on each of units 1, 2, 3, and 4, unit1 was reorganized and the questions were changed to emphasize more in practicing students' thinking skills. The lesson adjustments are presented in the table below.

Table 19. Lesson plan comments from experts

Unit	Comments from experts	Adjusted lesson
Unit 1 Pen Friends	- Good topic and activities for students. - Do not use too many questions, some questions are not necessary, choose only questions to practice students' thinking abilities.	- Reorganize and change the questions to the order of questions to practice students' thinking skills. - Cut and add some questions that practice students' thinking skills.
Unit 2 Travel	- Starting introduction of travel with Paris City is too far experience for students, choose city that relates to Chiang Mai because it is easier for students to make comparison.	- Build students' background knowledge by using Beijing instead of Paris.
Unit 3 Entertainment	- The contents of reading passage about magazine, need to be adjusted to students' background knowledge. - Using lots of questions help the students to practice to use their thinking skills.	- Simplify reading passages from magazines to compound to students' level of English proficiency. - Add more questions that encourage students to use thinking skills.
Unit 4 Traditions	- Need to choose traditions which are in common, do not be too specific. - Comparing traditions might not lead students to use their thinking skills, so need to add more activities.	- Select only 1 or 2 traditions which are widely known by people around the world. - Add activities by allowing students to do a role play of Thai and other traditions and present them on a bulletin board.

After their revision, the lesson plans were implemented to Mattayom Suksa 3 (grade 9) students at a secondary school for a period of 28 hours. During the time of teaching, two evaluators assessed the lessons and teaching performance by completing the observation form.

3.2 Reflections on the teaching performance by evaluators

After class observation, the evaluators also gave overall detailed reflections for improvement of teaching performance. Results of the evaluation by the observers are presented in Table 20.

Table 20. Overall reflections on teaching performance by evaluators

NO.	Teaching performance	Mean score	Interpretation
1.	Teaching preparation	4.75	Excellent
2.	Teaching presentation	4.57	Excellent
3.	Teaching methodology	4.74	Excellent
4.	Teachers' questions used	4.56	Excellent
5.	Teacher and students interaction	4.56	Excellent
6.	Teacher's personal characteristic	4.54	Excellent
	Total	**4.62**	**Excellent**

The overall mean score of reflections on teaching performance by evaluators, which focused on teaching preparation, methodology, presentation, teachers' questions used, interaction, and personal characteristics was ($\bar{x}$ = 4.62) excellent.

From the results of the curriculum evaluation of two experts before the implementation together with the observation by the evaluators, the curriculum of training course was inferred to be valid and reliable.

During the implementation of the lesson plans, the two evaluators gave some reflections on the lesson activities and these reflections are presented in the table below.

Table 21. Evaluators' oral reflections

Unit	Adjust lesson	Oral reflection
Unit 1 Pen Friends	- No change	-Students enjoyed participating in class activities. -There are many interesting activities.
Unit 2 Travel	-No change	-Activities led students to become self-directed learners.
Unit3 Entertainment	-Adapted reading content to fit with students' background	-It might take longer time for students to read and understand magazines.
Unit 4 Tradition	-No change	-Students found that there are many ways of learning traditions.

With the evaluators giving reflections on each unit, it was found that activities related to the lessons led students to enjoy learning English, practiced them to become self-directed learners and allowed them to use learning strategies.

3.3 Results from teacher logs

Results of the data gathered on class interactions and lesson obstacles together with reflections of teachers on class activities which they faced during implementation of the learner-centered training course, are presented below.

Table 22. Teacher logs

Unit	Adjusted lesson	Teacher logs
Unit 1 Pen Friends .	-Group work on setting questioning about family, school, routine, and free time activities should be changed to be pair work instead. -The assignment to write and email letter to pen friends should be changed to write the mail by hand delivery to their peers if internet is down. -After writing a mail, students should send it to their peers instead of sending through internet if internet is down.	-Students did not spend too much time working together in pairs. -Internet sometimes is down and cannot be accessed. -Students started to use their background knowledge with the knowledge in the classroom and applied them in real situations.

Unit	Adjusted lesson	Teacher logs
Unit 2 Travel	-Extend this lesson to two hours. -After writing brochures, students should do self-evaluation and peer evaluation.	-It is important to allow students to spend their time while doing activities. -Students compared and discussed about peers' brochures. They found that their peers were creative and adaptable. -Students used their thinking skills. They synthesized and evaluated the activities by giving scores and comments.
Unit 3 Entertainment	-Adapted reading content to fit with students' background.	-Students loved to talk about what they like on the magazines. -Students had fun in creating their own magazines. -Students chose their own topics and organized them to make their magazines more interesting.
Unit 4 Tradition	-Provided situations, in which students could show how they respond with acting. -Added Korean songs to give students opportunity to learn other different traditions.	-Students enjoyed and were interested a lot in the role play. -Students were very interested in everything about Korea. -Students expanded their learning by searching for more information and knowledge from different sources. They found that it was very interesting when they presented their new topics to their friends.

It was found that class activities had to be adjusted to correspond to students' behaviors and timing; they needed to spend time doing the class activities. Students enjoyed the activities which allowed them to share something that they were interested in.

Data from the observation form, oral reflections of the evaluators, and teacher logs were used to adjust and develop the lesson plans, as presented in the following table.

Table 23. The adjustment of the lesson plans during the implementation of lesson plans

Unit	Lesson plan No.	Lesson's contents	Adjustment	Reasons	Supporting evidence
1	1	Introduction to pen friends	No change	Students achieved the objectives.	Students applied their background knowledge and discussed about pen friends in class.
1	2	Vocabulary of family, school, routine, and free time activities	No change	Students achieved the objectives.	Students can brainstorm for a variety of vocabulary.
1	3	Interview friends	Group work on setting questioning about family, school, routine, and free time activities should be changed to be pair work instead.	Half of students did not pay attention to assignment while doing group work.	-
1	4	Write letters to pen friends	The assignment to write and email letter to pen friends should be changed to write the mail by hand delivery to their peers if internet is down.	Computers and internet connection were limited and down.	Teacher logs: Internet sometimes is down and cannot send emails to peers.

Unit	Lesson plan No.	Lesson's contents	Adjustment	Reasons	Supporting evidence
1	5	Send letters to pen friends via email	After writing mail, students should send it to their peers instead of sending through internet if internet is down.	Computers and internet connection were limited.	-
2	6	Introduction to travel	No change	Students achieved the objectives.	Students linked their background knowledge about attractive places all over the world.
2	7	Jigsaw reading about Mexico	Extend this lesson to two hours.	Doing jigsaw reading took long time.	-
2	8	Comparison between Mexico and Chiang Mai	No change	Students achieved the objectives.	Students could compare similarities and differences of Mexico city and Chiang Mai city.
2	9	Chiang Mai City	No change	Students achieved the objectives.	Students could tell identity of Mexico city and Chiang Mai city.
2	10	Find solutions for tourists	No Change	Students achieved the objective.	Students could find the solutions.
2	11	Tourist expressions	No change	Students achieved the objectives.	Students could use tourist expressions in some situations.
2	12	Vocabulary of travel	No change	Students achieved the objectives.	Students could apply and use vocabulary about travel in some contexts.
2	13	Create tourist brochures	No change	Students achieved the objectives.	Students could create their own design of tourist brochures.
2	14	Tourist brochures evaluation	After writing brochures, students should do self-evaluation and peer evaluation.	To strengthen their evaluation in thinking skills.	-
3	15	Magazine knowledge background	No change	Students achieved the objectives.	Students linked their background knowledge about magazines and shared to the class.
3	16	Vocabulary of magazines	No change	Students achieved the objectives.	Students were able to tell meanings of vocabulary about magazines from context clues.
3	17	Read real magazines	No change	Students achieved the objectives.	Students were able to read and tell about what they had read from the magazines.
3	18	Answer questions about magazines	No change	Students achieved the objectives.	Students were able to answer the questions from the magazines.
3	19	Share their ideas about magazines by writing	No change	Students achieved the objectives.	Students were able to write about what they were interested in from magazines.
3	20	Create their own magazines	No change	Students achieved the objectives.	Students were able to choose their interesting topics from magazines and create their own magazines.
4	21	Introduction of traditions	No change	Students achieved the objectives.	Students were able to link their background about different traditions.
4	22	Comparing other traditions with Thai traditions	Provided situations, in which students could show how they reacted to situations by role-plays.	Students could practice their thinking skills through situations.	-

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Unit	Lesson plan No.	Lesson's contents	Adjustment	Reasons	Supporting evidence
4	23	Applying traditions knowledge in real life	Added Korean song to give students an opportunity to learn other traditions.	Students could practice thinking skills about traditions from the topic that they were interested in.	-
4	24	Other traditions	No change	Students achieved the objectives.	Students were able to tell about other traditions based on their background knowledge.
4	25	Applying traditions knowledge in real life from sources.	No change	Students achieved the objectives.	Students were able to apply their background knowledge and compare it with their real life.
4	26	Organize information of different topics of traditions.	No change	Students achieved the objectives.	Students were able to search and organize different topics about traditions.
4	27	Design their bulletin board about traditions.	No change	Students achieved the objectives.	Students were able to apply information and put on the bulletin board.
4	28	Present the traditions' bulletin boards	No change	Students achieved the objectives.	Students were able to present about different traditions in front of the class.

Table 23 shows that 7 lesson plans were adjusted according to comments from experts, evaluators' reflections, and teacher logs before implementation. There were 4 reasons for adjusting the lesson plans: 1) time limitation, 2) class interaction, 3) limitation of computers and internet connection, and 4) class activities, which aim to strengthen the students' thinking skills.

4. Learners' thinking skills before and after the implementation of the training course

Objective 2: To examine learners' thinking skills before and after applying the training course.

Thinking skills before the implementation of the training course were examined by using questionnaire and pre-test. Attitudes and beliefs of students in their English language learning were also investigated.

4.1 Thinking skills before applying the training course

Before students were trained by the learner-centered training course, their thinking abilities were evaluated by using questionnaire and pre-test.

4.1.1 Students' thinking skills collected from a questionnaire

Data about the thinking skills of the students before applying the training course were collected using a questionnaire which was divided into three parts, namely, part A, part B, and part C, all of which investigated analytical, creative, and practical thinking skills, respectively. Results are shown in the following tables.

Part A: Analytical thinking skills

The mean and interpretation of frequency of usage of analytical thinking sub-skills, namely, analysis, synthesis, and evaluation, are presented in the table below.

Table 24. Students' analytical thinking skills usage

Item	Questions	Thinking skills	Mean	Interpretation (Frequency of usage)
1.	I like to compare and rate different ways of doing things.	Analysis	3.38	Sometimes
2.	I enjoy analyzing grading or comparing things.	Analysis	3.38	Sometimes
	Total mean score of analysis skill		3.38	Sometimes
3.	I like to check and rate opposing points of views.	Synthesis	3.52	Often
	Total mean score of synthesis skill		3.52	Often
4.	I prefer to grade the design or method of others.	Evaluation	3.48	Often
5.	I like to study and rate different views and ideas.	Evaluation	3.24	Sometimes
	Total mean score of evaluation skill		3.36	Sometimes
	Total mean score of the usage of analytical thinking skills		*3.40*	*Sometimes*

Table 24 shows that students sometimes used analytical thinking skills. When considering the three sub-skills, the students were found to sometimes use analysis and evaluation skills but most often used synthesis skills in their learning. Mean scores were 3.38 (analysis), 3.52 (synthesis), and 3.36 (evaluation). The total mean score of the usage of analytical thinking skills was 3.40.

Part B: Creative thinking skills

Creative thinking skills were divided into four main sub-skills: fluency, flexibility, originality and elaboration. Results of mean and interpretation of these four thinking sub-skills using the questionnaire are presented in Table 25.

Table 25. Students' creative thinking skills usage

Item	Questions	Thinking skills	Mean	Interpretation (Frequency of usage)
1.	I use my own ideas and strategies to solve problems.	Fluency	2.96	Sometimes
	Total mean score of fluency skill		2.96	Sometimes
2.	I like situations where I can use my own ideas and ways.	Flexibility	4.24	Often
	Total mean score of flexibility skill		4.24	Often
3.	I like problems where I can try my own way of solving.	Originality	3.14	Sometimes
4.	When working on a task, I like to start with my own ideas.	Originality	3.14	Sometimes

Item	Questions	Thinking skills	Mean	Interpretation (Frequency of usage)
	Total mean score of originality skill		**3.14**	**Sometimes**
5.	I feel happier about a job when I can decide for myself.	Elaboration	3.38	Sometimes
	Total mean score of elaboration skill		**3.38**	**Sometimes**
	Total mean score of the usage of creative thinking skills		***3.37***	***Sometimes***

Results from Table 25 revealed that most students sometimes used their creative thinking skills. After investigating the four sub-skills, it can be seen that students often used flexibility skill, and sometimes used fluency, originality and elaboration skills in their learning. The mean scores were 4.24, 2.96, 3.14, and 3.38, respectively. Total mean score of the usage of creative thinking skills was 3.37.

Part C: Practical thinking skills

The practical thinking skills consisted of two sub-skills, namely, application and adaptation skills. Results of practical thinking sub-skills are presented in the table below.

Table 26. Students' practical thinking skills usage

Item	Questions	Thinking skills	Mean	Interpretation (Frequency of usage)
1.	I like projects with clear structure and set plan and goal.	Application	3.45	Often
2.	I enjoy working on things I can do by following directions.	Application	3.31	Sometimes
3.	I like situations, in which my role is clearly defined.	Application	3.31	Sometimes
	Total mean score of application skill		**3.35**	**Sometimes**
4.	I like to follow definite rules or directions.	Adaptation	3.17	Sometimes
5.	I check to see what method or procedure should be used.	Adaptation	3.00	Sometimes
	Total mean score of adaptation skill		**3.08**	**Sometimes**
	Total mean score of the usage of practical thinking skills		***3.24***	***Sometimes***

Table 26 shown above presents that the practical thinking skills of students were sometimes used when learning. Dealing with the sub-skills of practical thinking skills, students defined that they sometimes used both application and adaptation skills. Mean scores were 3.35 and 3.08, respectively, while total score of the usage of practical thinking skills was 3.24.

4.1.2 Thinking skills collected from thinking test

Before and after the students were trained with the training course, their analytical, creative, and practical thinking skills were examined and compared to see any improvement. Results of the comparison are presented in the following tables. Data about the students' thinking skills were collected using means of the test that

aimed to measure students' analytical, creative, and practical thinking skills including their sub-skills.

Table 27. Results of mean scores improvement of analytical, creative, and practical thinking skills

Thinking skills	Total score	Pre-test		Post-test		Improvement	Percentage of improvement
		Mean score	S.D.	Mean score	S.D.		
Analytical	15	3.25	0.41728	5.33	0.47131	2.08	13.86
Creative	20	7.19	0.13424	11.42	0.19185	4.23	21.15
Practical	10	3.93	0.10464	5.25	0.16001	1.32	13.2
Total	45	14.37	0.17259	22.00	0.17127	7.63	16.95

Table 27 shows the scores of students' thinking skills. From the table, the pre-test mean score of students' overall thinking skills is 14.37 from 45 and the post-test is 22.00. There is an improvement of 7.63 or 16.95%. When looking at the pre-test mean score of analytical thinking skills, the pre-test mean score is 3.25 from 15 while the post-test is 5.33, with an increase of 2.08 or 13.86%. When looking at pre-test mean score of creative thinking skills, the pre-test mean score is 7.19 from 20 while the post-test is 11.42, with an increase of 4.23 or 21.15%. And, for practical thinking skills, the pre-test mean score is 3.93 from 10 while the post-test is 5.25, with an increase of 1.32 or 13.2%. Results revealed that students had developed their thinking skills in analytical, creative, and practical thinking skills after they were trained using the learner-centered training course. When comparing the improvement of the three thinking skills, it can be seen that creative thinking skills increased the most (21.15%), followed by analytical thinking skills (13.86%), and practical thinking skills (13.2%).

Table 28. The comparison of pre-test and post-test of analytical, creative, and practical thinking skills

Thinking skills	Total score	Mean	S.D.	t	df	sig. (2-tailed)
Analytical	15	-0.57606	0.75041	-4.796	28	.000
Creative	20	-1.61206	0.38576	-19.760	28	.000
Practical	10	-1.58620	0.48687	-16.59	28	.000
Total	45	-1.25810	0.54101	-13.715	28	.000

Table 28 shows the results of the comparison of overall thinking skills between pre-test and post-test which indicated a statistically significant difference (t = -13.715, p < 0.05). It can be concluded then that the thinking skills used by the students after training had significantly increased. When looking into the three main thinking skills of pre-test and post-test of analytical thinking, creative thinking, and practical thinking, the difference was statistically significant with analytical thinking t = -4.796, p < 0.05, creative thinking t = -19.760, p < 0.05, and practical thinking t = -16.59, p < 0.05. This indicated a significant improvement of the analytical, creative, and practical thinking skills of the students.

When examining the sub-skills of analytical thinking skills, namely, analysis, synthesis, and evaluation, the results are presented in the tables below.

Table 29. The mean scores of sub-skills of analytical thinking skills

Sub-skills of analytical thinking skills	Total score	Pre-test		Post-test		Improvement	Percentage
		Mean score	S.D.	Mean score	S.D.		
Analysis	5	1.81	0.94671	2.64	0.94671	0.83	16.6
Synthesis	5	0.94	0.29245	1.78	0.29244	0.84	16.8
Evaluation	5	0.50	0.17086	0.91	0.03189	0.41	8.2
Total	15	3.25	0.41728	5.33	0.47131	2.08	13.86

Table 29 shows the mean score of pre-test and post-test of overall students' analytical thinking skills; the pre-test is 3.25 from 15 and the post-test is 5.33, indicating an improvement of 2.08 or 13.86%. When looking at the pre-test mean score of sub-skills of analytical thinking skills (analysis, synthesis, and evaluation), the pre-test mean scores are 1.81, 0.94, and 0.50 out of 5 while the post-test mean scores are 2.64, 1.78, and 0.91, with an increase of 0.83 (16.6%), 0.84(16.8%), and 0.41(8.2%), respectively. These results revealed that students had developed their sub-skills of analytical thinking skills (analysis, synthesis and evaluation) after the students were trained from learner-centered training course. When comparison was made on the improvement of three sub-skills, it can be seen that synthesis skills had the highest increase (16.8%), followed by analysis skills (16.6%), and evaluation skills (8.2%).

Table 30. The comparison of pre-test and post-test of sub-skills of analytical thinking skills

Sub-skills of analytical thinking skills	Total score	Mean	S.D.	t	df	sig. (2-tailed)
Analysis	5	-1.0000	1.48805	-3.619	28	.001
Synthesis	5	-0.6517	0.35093	-5.385	28	.000
Evaluation	5	-0.0765	0.41225	-5.385	28	.000
Total	15	-0.57606	0.75041	-4.796	28	.000

Table 30 shows that the results of the comparison of analytical sub-skills between pre-test and post-test are statistically significant (t = -4.796, p < 0.05). It can thus be concluded that the sub-skills of analytical thinking skills used by the students after training had significantly increased. When looking into the details of pre-test and post-test of sub-skills (analysis, synthesis and evaluation), the difference was statistically significant with analysis skill at t = -3.610, p < 0.05; synthesis skill at t = -5.385, p < 0.05; and evaluation skill at t = -5.385, p < 0.05, indicating that the analytical sub-skills of the students had improved significantly.

When investigating the details of creative thinking skills which were divided into 4 sub-skills, namely, fluency, flexibility, originality and elaboration, the results are presented in the tables below.

Table 31. The mean scores of sub-skills of creative thinking skills

Sub-skills of creative thinking skills	Total score	Pre-test		Post-test		Improvement	Percentage
		Mean score	S.D.	Mean score	S.D.		
Fluency	5	1.46	0.58525	2.75	0.61412	1.29	25.8
Flexibility	5	2.25	0.40941	2.65	0.40785	0.40	8
Originality	5	2.67	0.55139	3.14	0.59539	0.47	9.4
Elaboration	5	0.81	0.29426	2.88	0.87458	2.07	41.4
Total	20	7.19	0.13424	11.42	0.19185	4.23	21.1

Table 31 shows the mean score of pre-test and post-test of overall students' creative thinking skills with pre-test at 7.19 from 20 and post-test at 11.42. An improvement of 4.23 or 21.15% was shown. When looking at the pre-test mean score of the 4 sub-skills of creative thinking skills (fluency, flexibility, originality and elaboration), the pre-test mean scores are 1.46, 2.25, 2.67, and 0.81 (out of 5), respectively, while the post-test mean scores at 2.75, 2.65, 3.14 and 2.88, with an increase of 1.29 (25.8%), 0.40 (8%), 0.47 (9.4%) and 2.07 (41.4%), respectively. The results revealed that students were able to develop their sub-skills of creative thinking skills (fluency, flexibility, originality and elaboration), after the students were trained from learner-centered training course. When comparing the improvement of the four sub-skills, it can be seen that elaboration skill showed the highest increase (41.4%), followed by fluency skill (25.8%), originality skill (9.4%) and flexibility skill (8%).

Table 32. The comparison of pre-test and post-test of sub-skills of creative thinking skills

Sub-skills of creative thinking skills	Total score	Mean	S.D.	t	df	sig. (2-tailed)
Fluency	5	-1.03448	0.18570	-30.000	28	.000
Flexibility	5	-0.96552	0.18570	-28.000	28	.000
Originality	5	-1.13793	1.05979	-5.782	28	.000
Elaboration	5	-3.31034	1.16813	-15.261	28	.000
Total	20	-1.61206	0.64983	-19.760	28	.000

Table 32 shows the results of the comparison of sub-skills of creative thinking skills between pre-test and post-test. Differences were statistically significant ($t = -19.760$, $p < 0.05$) thus it can be concluded that the sub-skills of creative thinking used by the students after training had significantly increased. When looking into the details of pre-test and post-test of sub-skills (fluency, flexibility, originality and elaboration), differences were statistically significant: fluency skill $t = -30.000$, $p < 0.05$; flexibility skill $t = -28.000$, $p < 0.05$; originality skill $t = -5.782$; and, elaboration skill $t = -15.261$, $p < 0.05$, indicating that the students' sub-skills of creative thinking skills improved significantly.

When exploring in details the practical thinking skills consisting of 2 sub-skills (application and adaptation), results are presented in the tables below.

Table 33. The mean scores of sub-skills of practical thinking skills

Sub-skills of practical thinking skills	Total score	Pre-test		Post-test		Improvement	Percentage
		Mean score	S.D.	Mean score	S.D.		
Application	5	2.50	0.51031	3.49	0.57232	0.99	19.8
Adaptation	5	1.43	0.36232	1.76	0.34602	0.33	6.6
Total	**10**	**3.93**	**0.10464**	**5.25**	**0.16001**	**1.32**	**13.2**

Table 33 shows the mean scores of pre-test and post-test of overall students' practical thinking skills with the pre-test at 3.93 from 10 while the post-test was 5.25. An improvement of 1.32 or 13.2% was measured. When looking at the pre-test mean scores of sub-skills of practical thinking skills (application and adaptation), the pre-test mean scores are 2.50, and 1.43 out of 5 while the post-test mean scores are 3.49 and 1.76, showing an increase of 0.99 (19.8%) and 0.33 (6.6%), respectively. Results revealed that students had developed their sub-skills of practical thinking skills (application and adaptation), after the students were trained from learner-centered training course. When comparing the improvement of two sub-skills, it can be seen that application skill showed the highest increase (19.8%) while adaptation skill had an increase of 6.6%.

Table 34. The comparison of improvement of sub-skills of practical thinking skills

Sub-skills of practical thinking skills	Total score	Mean	S.D.	T	df	sig. (2-tailed)
Application	5	-2.37931	0.56149	-22.820	28	.000
Adaptation	5	-0.79310	0.41225	-10.360	28	.000
Total	**10**	**-1.58620**	**0.48687**	**-16.59**	**28**	**.000**

Table 34 shows that the results of the comparison of practical thinking sub-skills between pre-test and post-test with difference found to be statistically significant (t = -16.59, p < 0.05). It can then be concluded that the sub-skills of practical thinking skills used by the students after training had significantly increased. When looking into the details of pre-test and post-test of sub-skills (application and adaptation), their differences were calculated to be statistically significant with application skill at t = -22.820, p < 0.05, and adaptation skill at t = -10.360, p < 0.05. This indicated that students' sub-skills of practical thinking skills improved significantly.

4.2 Formative assessments: teacher logs, project work and portfolio

During the implementation of the training course, the students' thinking skills were investigated to find out the improvement through formative assessments which included teacher logs, project work and portfolio.

4.2.1 Teacher logs

During the time of the training course, the students' performances were investigated while on the process of participation and their performances were being recorded in the teacher logs. These logs were recorded unit by unit and they include students' class interaction, lesson obstacles and teachers' reflections on the lessons. Results of teacher logs are presented in the table below.

Table 35. Teacher logs

Unit/Formative assessments	Students' class interactions	Lesson obstacles	Teachers' reflections
1 : Pen Friends	1. Comparison between Western and Thai culture from the reading passage. (In class) 2. Reply pen friends' letters and send to their pen friends via email. (Individual) 3. Presentation of pen friends' letters, culture, and pictures. (Group work)	Internet sometimes is down and cannot be accessed.	- Students did not spend too much time to get to work together in pairs. - Students started to use their background knowledge with the knowledge in the classroom and applied them in real situations.
2 : Travel	1. Answer questions from the reading passage of Mexico City. (In class) 2. Compare and contrast differences and similarities between Mexico City and Chiang Mai. (In class) 3. Study and use correct expressions and structure for tourists in giving directions and information in example contexts. (In class) 4. Write and design tourist pocket book. (Group work)		- It is important to allow students to spend their time while doing activities. - Students compared and discussed about peers' brochures. They found that their peers were creative and adaptable. - Students used their thinking skills, they synthesized and evaluated activities by giving scores and comments.
3 : Entertain-ment	1. Read and answer questions from the reading passage of British Teen Magazine. (In class) 2. Read and answer questions from magazines. (In class) 3. Design their own magazine for their school. (Individual)		- Students loved to talk about what they like on the magazines. - Students had fun in creating their own magazines. - Students chose their own topics and organized them to make their magazines more interesting.
4 : Traditions	1. Answer questions from listening about traditions of other countries. (In class) 2. Answer questions from reading passage about traditions of other countries. (In class) 3. Read and answer questions from reading passage about cell phone etiquette. (In class) 4. Compare and contrast between Thai and other traditions from different countries.	-	- Students enjoyed and were interested a lot in the role-play. - Students were very interested when talking about everything about Korea. - Students expanded their learning by searching and applying outside knowledge. They found that it was interesting when they presented their new topics to their friends.

Unit/Formative assessments	Students' class interactions	Lesson obstacles	Teachers' reflections
Portfolio	- Students' portfolio - Students collected and organized their works and assignments.	-	- Students created their own work. - Students organized their work into their own portfolios. - Students had good responsibility for their own portfolios.
Project work	- Students' project work - Designed and organized bulletin board about traditions of different countries.	-	- Students planned how to start and work on their project work. - Students learned to set goals. - Students were active in participating searching for other sources. - Students chose to present new topics, which related to their interests. - Students practiced their analytical thinking skills in by presenting new topics to class. - Students practiced their creative thinking by creating their own appearances of their project works. - Students practiced their practical thinking by applying their background knowledge with the real life.

Table 35 shows that students developed their ability in thinking skills from each unit. In unit 1, students started to use analytical and practical thinking by analyzing knowledge and using their background knowledge with the classroom knowledge and applying them in real situations. In unit 2, students used analytical thinking for comparing and discussing about peers' brochures. They found that their peers were creative and adaptable, and they also synthesized and evaluated the activities by giving scores and comments on their peers' brochures. For unit 3, students developed their creative thinking by choosing their own topics and organizing them to make their magazines more interesting. For unit 4, students used their analytical, creative, and practical thinking skills in expanding their learning by searching for other sources of knowledge, applying the knowledge to situations, and choosing to present their new topics to their friends. Besides, their thinking improvement from formative assessments of portfolios and project work were also investigated. It was found that students were able to develop their ability in thinking skills. Students also created and organized their portfolio and their project work while they practiced their analytical thinking skills by presenting new topics to class, practicing their creative thinking by making their own appearances of the project work, and practicing their practical thinking by applying their background knowledge with the one of the real life.

4.2.2 Project work

At the last session of the training course, students were assigned to construct project work and rubrics were used to evaluate students' thinking skills. The resulting scores and percentages are presented in the table below.

Table 36. The scores of students' thinking skills based on project work

Thinking skills	Total score	Raw score	Percentage	Interpretation (Level of thinking ability)
Analytical	9	7.65	85	Excellent
Creative	6	5.44	90.6	Excellent
Practical	6	4.93	82.16	Excellent
Total	21	18.02	85.80	Excellent

Table 36 shows that students were able to develop their thinking skills (analytical, creative, and practical thinking skills) as indicated by the total raw score for thinking skills at 18.02 which was equivalent to 85.80%. By the end of their project work, the students' thinking skills were measured at an excellent level.

4.2.3 Portfolio

After the students finished their class assignments, they were assigned to collect and organize their assignments into portfolio. The rubrics were used to evaluate students' thinking skills and the scores and percentage are presented in the table below.

Table 37. The scores of students' thinking skills based on portfolio

Thinking skills	Total score	Raw score	Percentage	Interpretation (Level of thinking ability)
Analytical	9	6.79	75.44	Good
Creative	6	4.89	81.5	Excellent
Practical	6	4.03	67.16	Average
Total	21	15.71	74.80	Good

Table 37 shows that during the training, the students were able to improve their thinking skills (analytical, creative and practical thinking skills). The total raw score of thinking skills was measured at 15.71 or an equivalent of 74.80%. Based on the records of portfolio, students' thinking skills are at a good level.

5. Conclusion

This chapter presented the data gathered through questionnaires, interviews, pre-test and post-test, teacher logs, project work and portfolio. Data presented here were aimed to answer the questions related to the effectiveness of the learner-centered training course. It can be said that the learner-centered training course was able to significantly increase the thinking skills of the students who were able to both learn and know how to think analytically, creatively, and practically.