



Teaching and learning innovation using design thinking process to enhance the quality of life of the community: A case of Ban Toon Subdistrict Administrative Organization, Phayao Province

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Abstract

This study aims to: (1) examine an approach of innovative design thinking to the Local Governance course at Ban Toon Subdistrict Administrative Organization (SAO), Muang District, Phayao Province and (2) introduce the result of this innovation as a guideline for the development of teaching and learning model that enhances the quality of life of the community. The research tools are pre-and post-tests, questionnaires, and an interview. A purposive sample group of 70 is selected from third-year political science students, local personnel of Ban Toon SAO, and community representatives. The statistics used for analysis are percentage, mean, standard deviation, and paired sample *t*-test. The results reveal that (1) Teaching and learning using the design thinking process is an appropriate method that helps learn how to solve community problems at the highest level ($\bar{x} = 4.87$). The student's *t*-test increased significantly at .01; (2) The implementation of innovative teaching and learning through design thinking in the local government office of Ban Toon has been recommended and accepted significantly at a high level ($\bar{x} = 4.11$). An application of Traffy Fondu is one of the alternatives proposed to use as a public communication channel among the people in the community of Ban Toon. Unfortunately, the sample group is not proficient in using the application. Recommendation from the study is that more research on methods for teaching and learning in actual work site should be upheld.

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Introduction

As a result of globalization and the effects of rapid developments in technology, society, and the economy around the world, the 21st century has become a period of challenge in teaching and learning methods. Education institutions, teachers, and learners must adapt to cope correctly in line with the changing circumstances. Educational institutions have been trying to find teaching methods to create good skills and competent manpower for the future. At the higher education level, teaching methods should be the most beneficial to learners to acquire knowledge as well as to apply the theoretical concepts studied in their communities and their own daily lives sustainably. Examples of this effort include Implementing teaching methods that promote lifelong learning so that learners can live in various situations. Active Learning is one of the methods that could be applied at this place. It presents intellectual creativity with a learning process that emphasizes student participation and interaction in several learning activities. This variety of practical methods such as analysis, synthesis, brainstorming, exchange of ideas, problem-based learning, and case studies helps learners to best assess information in new situations (Wongpaibool, 2017).

In addition to the new education sphere, modern communication skills and the use of innovative information technology should be developed as well. Obviously, for the Active Learning process, learners participate in activities with the teacher and the learners together when the instructor has the role of providing the learners with a suitable learning environment instead. Rueangsawan (2010) discussed the characteristics of popular learning-based teaching and learning activities, such as teaching and learning that develops brain potential or learning in which learners could organize their own learning process. This includes process of creating situations for learners to read, speak, listen, and emphasis on higher-level thinking skills to gain knowledge from direct experience. To this point, Center for Teaching Innovation, Cornell University (2023), confirmed that active learning methods ask students to engage in their learning by thinking, discussing, investigating, and creating or designing. When in class, students can practice several skills, struggle with complex questions, propose solutions, and explain ideas in their own words through writing and discussion. Equitable Education Fund (EEF), Thailand also applies an example of a student-centric teaching method that emphasizes active learning by 5 Steps to develop learners' skill : (1) Ask questions,

(2) Seek information and knowledge, (3) Create a body of knowledge, (4) Learn how to communicate, and (5) Disseminate knowledge - give back to society (EEF, 2021).

Design Thinking instructional process or learning by doing is one of the most essential student-centered teaching methods. It is a proactive human-centered design active learning approach that higher education institutions are interested in using as a new teaching and learning model to increase efficiency in accordance with curriculum goals. The concept of design thinking was originally developed for industrial product design by John E. Arnold in 1959 (Arnold, 2016). It was later introduced in 1987 at the Graduate School of Design at Harvard University by Rowe (Rowe, 1991). This teaching technique was better well known when David Kelly proposed it as a human-centered problem-solution approach at Stanford University as well as in the business world of IDEO in the 1990s onwards (Koshihadej, 2022). The Design Thinking instructional process, published in the Harvard Business Review in 2008, consists of five steps: (1) Empathize; (2) Define; (3) Ideate; (4) Prototype; and (5) Test (Israsena & Treerattanaphan, 2017). This dramatic method is a creative problem-solving that emphasizes experimental learning. Characterized by an iterative process from creating human understanding and user testing to learning and reducing errors, design thinking is also conducive to developing new ideas and solutions. This has been well revealed by Cox (2016, p. 2) : *“Design thinking is a people-centered, collaborative and action-orientated way to understand, reframe and solve problems....”* According to a study by Phoonkhetkid (2020), it was mentioned that the use of design thinking concepts in teaching and learning management can increase creative and innovative skills for learners effectively at the 75.00/76.19 level. In addition, applying the design thinking process to develop teaching and learning activities in General Education subjects of second-year students, University of Phayao, it was found that the students' average score after the activity was significantly improved with statistical significance at the .5 level (Thephinlap et al., 2022). The advantages of design thinking were also highlighted by Kanjanasapsin (2021) that the thinking methods of students who participated in the ASIAN LEADERSHIP ACADEMY's design thinking program were changed and developed. He agreed that design thinking can increase the efficiency of learning management.

In this study, the presentation of teaching and learning with innovative design thinking could be a great tool to help learners understand people's behavior and the community's needs. It might develop into a proactive teaching and learning innovation in the domestic area

of the Local Governance course, where students would have an opportunity to closely experience the work of local government officials. It is one of several subjects for third-year Political Science students in Bachelor's degree, School of Political and Social Sciences, University of Phayao. The general practice of the subject is to study knowledge in the classroom, visit the village, analyze some case studies, and report to the class without applying the results to the community in real life. The course content focuses on the concepts and theories of local administration, decentralization, related factors in political and socio-economic areas, influencing local administration, problems, and trends of developments. The students would also be able to propose specific ways to promote the community's quality of life to government organizations through this teaching method because the quality of life of the community is important, both at the individual and family levels. When a person has a strong body with good health, it results in cost savings, the ability to carry out his/her career efficiently, and finally, a happy family. The word "quality of life" in this place, according to United Nations Educational, Scientific and Cultural Organization (UNESCO, 1993), means the level of well-being of a society and the satisfaction of human's basic needs. It is a multidimensional concept that coordinates a person's perception. As mentioned by the WHOQOL-100 (The WHOQOL Group, 1994), there are 6 criteria for human quality of life, namely: (1) physical domain, (2) psychological domain, (3) level of independence, (4) social relationship, (5) environment, and (6) spiritual personal beliefs. It might be said that quality of life is crucial both at the social and national level. The good quality of life of the population in a society also means the good quality of life of the country as well. That is why, at present, governments in various countries are aware of the importance of the need to take care of the quality of life.

From the aforementioned reasons and intention to fill the gap of the former teaching model, the researcher is interested in carrying out the project at Ban Toon Community, Muang District, Phayao Province, which is an example of a society that still lacks some quality of

life in terms of physical domain (economic and income). Conforming to a preliminary study of the Ban Toon area, the main source of income is from farming. There is evidence of people abandoning their residences to work elsewhere, the promotion of community products is uneven, and a high rate of 39.28 percent elderly (Ban Toon SAO, 2022). Furthermore, the Thailand quality of life index 2022 shows that Phayao is one of the 10 provinces that have the lowest average household income per year (Community Development Department, 2022). For Ban Toon sub-district, 59.37 percent of people have incomes of less than 10,000 baht per month. However, the community has a participatory living culture and ecotourism is well promoted.

This study has two objectives: (1) to study teaching and learning innovation using the design thinking method to enhance the quality of life of the community of Ban Toon, Phayao province and (2) to introduce the result of this innovation as a guideline of teaching and learning model that enhances the quality of life of the community. With the new teaching approach, students would attain appropriate skills and competencies according to the present needs of labor markets.

Methodology

Research Design

This study is a mixed methods experimental design research. The procedure is divided into two parts: The first part is a study of an approach of innovative design thinking for teaching and learning in local administration subjects. The students are expected to explore the SAO's duties and community living styles, including the economic status and support needed from the SAO. A one group learning skills pretest-posttest design type is used to examine the study outcomes. The second part is to verify the results of the design thinking output and its appropriateness as a teaching innovation to enhance the quality of life in local areas. The research is conducted under the following framework (Figure 1).

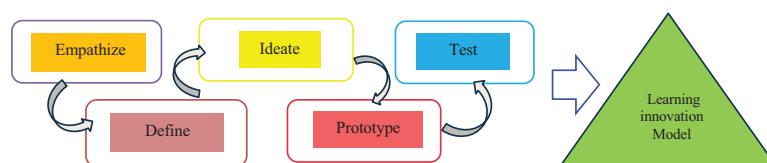


Figure 1 Theoretical framework of Design Thinking process (applied from Rowe, 1991)

From **Figure 1**, the theoretical framework of Design Thinking process is divided into five major steps as follows.

Step 1 Empathize. The student group is expected to research what is the style of living of the community, what are their problems or needs, what causes these problems, and what are the roles of Ban Toon SAO to the community related to the knowledge gained from the class during weeks 1–8.

Step 2 Define. It is necessary to restate the problems concerning the community's way of living and the main factors that influence these problems. Every detail related to the problems must be clearly defined.

Step 3 Ideate. The group should try to create possible ideas to solve the situations or problems they found. Assumptions might be a bit challenging.

Step 4 Prototype. This is an important part in that one best solution to help promote community quality of life would be selected and the job is done.

Step 5 Test. Finally, a good result would not be discovered if the created prototype was not tested. This step would show if the capacity of the product of the design thinking process meets the community's problem or not.

Population and Research Tools

The research population consists of 3rd year B.Pol. Sc. second-semester students in 2022 academic year, Ban Tun Subdistrict Administrative Organization (SAO) personnel, and representatives of communities from 11 villages of Ban Tun subdistrict, Mueang, Phayao Province (Ban Toon SAO, 2022). Data sampling is done

in accordance with the study period and the composition of the local government. The 70 total number of purposive sampling is consequently selected. They are: 29 students enrolled in the Local Governance course, 19 personnel of Ban Toon SAO, and 22 community representatives.

The research tools are designed for each group of the study as follows:

1. The pre-and post-learning skills tests with 40 multiple choice questions (IOC = 0.93–1, Alpha = 0.8671) are used for the group of 29 students.

2. A semi-structured interview form about spatial data, the duties and responsibilities, management style, problems, and obstacles of the local government office is set for the administrative group.

3. The last tool is Best (1977) scale questionnaire of 12 questions, which included three open-ended questions about the usefulness, adequating, and appropriateness of innovation from the study is determined for all the sample groups (IOC = 1, Alpha = 0.7891).

Data Collection

There are three steps for data collection

1. The student group is prepared to follow the design thinking schedule and the collecting of data from pre-test and post-test is done along with the interviews and the distribution of questionnaires as shown in [Table 1](#).

2. The student group start the field work in Week 10–14 (Empathize- to understand the problem and Define the problem clearly) by using a semi-structured interview form to collect data about the SAO duties and the community's opinion as well as their problems in everyday life.

Table 1 Design Thinking-Based Education Program for 15 learning weeks (one semester)

Process	Schedules	Activities	Evaluation
Part 1			
Empathize	Nov. 2022 Week 1–8	Study according to Course Content of Local Governance (Students are focused on lessons in class and study from various texts to conform with the course syllabus)	Learning Skills Pre-Test in W.8
-	Week 9	Mid-semester Exam	No activities (students are obliged to follow the university schedules for examination period)
Define	Week 10–12	1st Field work (Define the problem of the community clearly)	-
Ideate	Week 13–14	2nd Field work (More data collecting, design/brainstorming for possible solutions to the problems found.)	Interviews, questionnaires
Prototype	Week 15 Feb 2023	Bring about possible solutions to share in the classroom	Learning Skills Post-Test
Part 2			
Test	Mar 2023	Delivery of a new experience (Innovation to be implemented) to Ban Toon SAO.	
	June 2023	Follow-up & Evaluation	Questionnaires

3. A questionnaire is distributed to the student group, the SAO personnel, and the community representative group to give their opinions on the acceptance and the benefits of teaching and learning innovation with design thinking that enhances the quality of life of Ban Toon community.

Data Analysis

To interpret all the quantitative data gained from the study, descriptive statistics, namely; percentage, mean, standard deviation, and paired sample *t*-test are used, while content analysis is done for qualitative data.

Results

The project output is quite fruitful in that the results from teaching and learning innovation using design thinking to enhance the quality of life of Ban Toon's community are fairly good for academic purposes as follows.

The comparison of average scores in learning skills of the 29 learners from pre- and post-tests is found statistically increased at .01 with the mean scores of the post-test increased by 6.42 percent (*t*-test = 1.311 (Table 2).

Table 2 Scores in learning skills before and after the Design Thinking activities (29 samples)

Testing of learning skills for Local Governance									
No.	Pre-Test (30)	Post-Test (30)	d	% increased	No.	Pre-Test (30)	Post-Test (30)	d	% increased
1	18.0	20.5	2.5	8.3	16	21.5	24.0	2.5	8.3
2	21.5	23.0	1.5	5.0	17	23.0	23.5	0.5	1.7
3	14.5	18.0	3.5	11.7	18	22.0	22.5	0.5	1.7
4	25.0	26.0	1.0	3.3	19	21.5	24.0	2.5	8.3
5	19.0	19.5	0.5	1.7	20	16.0	19.5	3.5	11.7
6	19.5	20.5	1.0	3.3	21	22.0	22.0	0.0	0.0
7	15.5	17.5	2.0	6.7	22	18.0	18.5	0.5	1.7
8	17.0	20.0	3.0	10.0	23	18.5	19.5	1.0	3.3
9	22.5	23.5	1.0	3.3	24	16.5	19.0	2.5	8.3
10	19.0	19.5	0.5	1.7	25	21.0	25.5	4.5	15.0
11	21.0	23.5	2.5	8.3	26	12.5	12.0	-0.5	-1.7
12	17.0	18.5	1.5	5.0	27	17.5	22.0	4.5	15.0
13	20.0	20.0	0.0	0.0	28	21.0	24.5	3.5	11.7
14	20.0	19.5	-0.5	-1.7	29	14.5	19.0	4.5	15.0
15	22.0	23.0	1.0	3.3	-	19.21	20.97	51.0	6.42

Percentage of scores increased = 6.42

Percentage of students improved = 86.2

Pair Samples T-Test (comparison of average scores of pre-test / post-test) *t* = 1.311 at .01

As for the innovation, after steps 1–4 of the design thinking process are pursued, the learners have discovered some management problems of Ban Toon SAO's office and have proposed four areas of solutions: technology enhancement, domestic career support, tourism promotion, and protection of the environment. The details are as hereinafter.

1. Technology enhancement

Ban Toon SAO already has its own communication tools to use in the workplace and within the community such as the application Line and Facebook. However, the said technology does not seem to be used and could bring a communication problem into the community. Hence, the study group has proposed a new application, namely; *Truffy Fondue*, which is well-known among government offices.

2. Domestic career support

It was noticed that each career learning center was scattered and quite far from Ban Toon SAO. This makes some inconvenient to access. The study group, then, proposed an assemblage of small learning units into a large learning center that would help people who were interested in learning thoroughly.

3. Tourism promotion

Ban Toon SAO. has many beautiful and interesting places to visit, though, the office does not show enough capacity for tourism. The study group has suggested a tourism project by opening the village for tourists and arranging local services such as food, homestay, or visiting packages with the village lifestyle at a reasonable price.

4. Protection of the environment

In the manner of the community context, the villagers often burn the forests to collect rare and expensive plants (sweet vegetables). This practice has been happening for a long time and is one of the causes of smog and forest fires. This research group, thereupon, intends that Ban Toon SAO organize a campaign not to follow the traditional activity that requires burning forests to collect vegetables. The office may need to increase measures for surveillance and post notices in villages about the harmful effects of burning forests such as an increase in air pollution. Moreover, it is an urgent need to seriously ask for cooperation to refrain from burning.

For the verification of the design thinking method as an appropriate teaching innovation to enhance the quality of life in local areas, the research output is as follows.

1. To run the 5th step of the design thinking method (TEST), an application of *Traffy Fondu*, proposed by the learner group, is implemented by Ban Toon SAO as another communication channel between the local government and the community from March to June 2023. Notwithstanding, the output is a bit awkward

because of inadequate skills to make a function of the application, and the villagers prefer to continue with Line or Facebook. Therefore, to continue with "*Traffy Fondu*", training is needed in this place. **Figure 2** shows the access to the applications.

2. An analysis of data from the opinion of every sample group (70 samples) about the acceptance and the benefits of the learning style with design thinking and the prototypes from the learners that enhance the quality of life of Ban Toon community came out quite good. The result in this part shows high acceptance of the innovation model from the sample groups. More details are shown in **Table 3** and **Table 4**.

From **Table 3**, it is found that instructional management using the design thinking process contributed to solving community problems from the learner group at the highest level ($\bar{x} = 4.87$). It is remarked, especially in the *Teaching and Learning Model*, that the sample group stated the most appropriate ($\bar{x} = 4.97$) as the learning style makes it easier to understand the lesson.

Table 4 shows the opinions of the personnel and community representative groups on the acceptance and the benefits of teaching and learning innovation with design thinking that enhances the quality of life of Ban Toon community at a high level ($\bar{x} = 4.11$). Interestingly, the opinions on the benefits received by the SAO and the community are at the highest level ($\bar{x} = 4.28$), followed by the opinion about promoting quality of life at a high level ($\bar{x} = 4.19$) with a bit lower rate in the feasibility of innovation and its consonance with the community context ($\bar{x} = 3.86$).



Figure 2 Implementation of an innovation at BaanToon Subdistrict Administration Organization, Phayao Province
Source: Basic Data (Ban Toon SAO, 2022)

Table 3 Opinions on the acceptance and the benefits of teaching and learning innovation with Design Thinking that enhances the quality of life of Ban Toon community (29 samples from learner group)

Assessment	\bar{x}	SD	Interpretation
Teaching and Learning Model			
1. The method of teaching and learning by Design Thinking is suitable for this subject.	5.00	0.19	highest
2. The activities of studying in class and outside class in real situations help understand course context more easily.	4.97	0.19	highest
3. The arrangement of study time and field visits are appropriate.	4.93	0.26	highest
Sub-total	4.97	0.21	highest
Benefits			
4. This learning style helps analyze problems of SAO and the communities accurately.	4.63	0.48	highest
5. This learning style helps generate new ideas with a wider view.	4.82	0.53	highest
6. Learning by doing helps develop conceptual skills and can be applied to other cases.	4.94	0.29	highest
Sub-total	4.80	0.43	highest
Participation Skills			
7. Design Thinking method makes us think holistic and interdependent.	4.69	0.46	highest
8. Active Learning helps us be more generous and think for all.	4.85	0.35	highest
9. This learning style helps listen to people's opinions and needs.	4.84	0.44	highest
Sub-total	4.79	0.42	highest
Promoting community quality of life			
10. Teaching and learning innovation with design thinking helps find ways to promote community quality of life.	4.93	0.55	highest
11. Learners are like examiners to promote the well-being of the community.	4.92	0.37	highest
12. This learning style should be promoted in every community to live happily.	4.95	0.38	highest
Sub-total	4.93	0.43	highest
Total Average	4.87	0.37	highest

Table 4 Opinions on the acceptance and the benefits of teaching and learning innovation with Design Thinking that enhances the quality of life of Ban Toon community (41 samples from Ban Toon SAO personnel and community representative groups)

Assessment	\bar{x}	SD	Interpretation
Benefits to the organization and the community			
1. Applying Traffy Fondu would help better communication between the community and Ban Toon SAO.	4.86	0.34	highest
2. Having more channels of transmission with public organizations through social media eases living conditions.	4.03	0.41	high
3. Communicating with local administration through Traffy Fondu is faster and wastes no time.	3.95	0.36	high
Sub-total	4.28	0.37	highest
Possibility of innovation and concordance to community context			
4. Using Traffy Fondu is very simple.	3.72	0.53	high
5. Using Traffy Fondu requires a high-performance phone.	4.50	0.41	highest
6. Using social media networks is suitable for society of all ages.	3.35	0.49	medium
Sub-total	3.86	0.47	high
Promoting the quality of life			
7. Having a mutuality arrangement by the university for students to study in the community of Ban Toon helps alleviate the community's problems.	4.19	0.50	high
8. The students' activities outside the classroom in the community area assists in creating new service ideas and promote the quality of local public services.	4.15	0.36	high
9. You agree with active learning with the design thinking method of the university that could enhance better public services in the community.	4.24	0.47	highest
Sub-total	4.19	0.44	high
Total Average	4.11	0.42	high

Discussion

This research of “Teaching and Learning Innovation Using Design Thinking Process to Enhance Community Quality of Life: a Case of Ban Toon Subdistrict Administrative Organization, Phayao Province” is

conducted with the aims to examine an approach of innovative design thinking to the Local Governance course at Ban Toon SAO, Muang District, Phayao Province and to introduce the result of this innovation as a guideline for the development of teaching and learning model that enhances the quality of life of the community. The findings reveal below:

1. Teaching and learning using the design thinking process is an appropriate method that helps the student learn how to solve community problems at the highest level ($\bar{x} = 4.87$). From [Table 3](#), the sample group of learners has an opinion that the aforementioned approach is appropriate in regard to teaching and learning style which makes it easier to understand the lesson at the highest level ($\bar{x} = 4.97$). As shown in the result of this study, the students propose a solution to the SAO to try a new communication technology "*Traffy Fondue*". It is obvious that communication channel is considered essential to the community because this online technology could help the community to call for aid effectively in time if they have to confront a severe illness or accident that is harmful to life. In the case of domestic career support, it is also an urgent need of the community. Promoting secondary occupations for the community is a way to help the community increase their income and savings. The advantage of the design thinking method goes to the area of *Tourism promotion* and *Environmental Protection* as well. It results in the community's better quality of life. This is owing to the teaching and learning process that gives learners more opportunity to experience the community's context by themselves. They are able to analyze and synthesize the actualities discovered in the village and local government organization with the knowledge studied in class and make a judgment in designing to create a prototype to give new choices that match the community's needs for a better quality of life by their own sensibilities. To this point, it was stated before by Tim Brown (Tarnowski, 2018, p. 8) that "*Design thinking can be described as a discipline that uses the designer's sensibility and methods to match people's needs...*". Besides, the way in which the research has been undertaken is very much in line with the vision and desirable nature of 21st century teaching and learning for learners in the new global economy. In this notion, the P21 Partnership for 21st Century Skills emphasizes that learning in the 21st century must be knowledge-based and skills, expertise and competencies must be stressed for learners so that they can take advantage in today's changing society (Buothong, 2017). In terms of learning skills, the learner group gained higher scores from the post-test, which proves that the design thinking approach helps develop learners' skills after participating in activities significantly at .01 (t -test = 1.311). It might be well explained that applying the concept of design thinking in teaching and learning can effectively increase students' creativity and innovation skills (Phoonkhetkid, 2020; Kanjanasupsin, 2021). The reason is that the thinking

methods of the ones who participate in such a teaching technique are developed in a creative way. The students are encouraged to try to gather all possibilities that could extricate the problems and uphold local needs.

2. To the question that this teaching and learning innovation is conceded as a guideline for the development of teaching and learning that enhances the quality of life of the community, this proactive teaching has been significantly recommended and recognized by all the study groups. The score from the local personnel and community representatives group in [Table 4](#) is at a high level ($\bar{x} = 4.11$). They indicate opinions on the benefits received by the organization and the community at the highest level ($\bar{x} = 4.28$). The groups' attitudes about promoting quality of life and the possibility of innovation and its coherence with the community context are at high levels respectively ($\bar{x} = 4.19, 3.86$). The findings are consistent with that of Cox (2016), a freelance digital strategist and transformation specialist, especially the part of the product from innovation that promotes the community's quality of life. Cox views design thinking as human creative problem-solving, he insists that : "*Design thinking ...is less about the look of an item and more about the need that a product or service meets for customers*" (Cox, 2016 p. 2). Nevertheless, the result shows a medium score (3.35, 0.49) of opinion about using social media networks being suitable for society of all ages. This might be explained by two reasons. The first reason is that most of the samples do not have experience to start using the mentioned "*Traffy Fondue*" application and the SAO has not organized a training course for this new technology. The second reason can be explained by the community's economic status, which is quite limited.

Focusing on an application of *Traffy Fondue*, an innovation from the 5th step of the experiment, it is proposed to Ban Toon SAO to be used as an alternative choice of public communication channel among the community. Unfortunately, the technology is found to be a bit too complicated and the community encounters some problems of application instruction. That means training is needed.

It is gratifying that this research project has resulted in an innovative teaching and learning model with design thinking that enhances the community's quality of life to be used as a model for teaching and learning in other academic subjects as shown in [Figure 3](#).

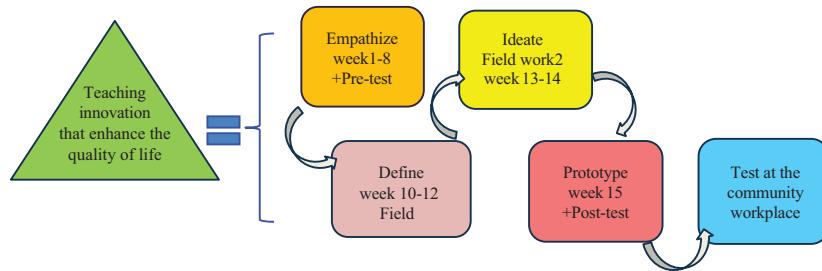


Figure 3 Suitable model for teaching and learning by using the design thinking process to enhance the quality of life of the community

Conclusion and Recommendation

With the output and outcome shown by this study, it is obvious that the approach to teaching and learning that enhances community quality of life by using the design thinking process, an important aspect of active learning that effectively develops high-level thinking skills, helps learners best analyze, synthesize and evaluate information in new situations. In addition, the teaching style urges learners to stay motivated so they can guide themselves throughout their lives as learners (Wongpaibool, 2017). Hence, such an innovative teaching and learning model could be considered as a tool that helps learners understand the behaviors and needs of the people they are studying with. The said approach would lead to the production of services that conform to the needs of the people and, in return, the students could gain an opportunity to learn and experience the situation which leads to the solutions by themselves.

From the study, it might be concluded that the teaching and learning innovation using the design thinking process can benefit in a comprehensive manner. First of all, it directly benefits learners who have adapted to modern learning methods and the changing environmental conditions. Secondly, it is beneficial for teachers to develop and improve their teaching and learning model in line with the new economic system of the 21st century. Finally, this human-centric teaching model is directly beneficial to the community to obtain a better quality of life services through the design thinking process advocated by the educational institutions. Most importantly, in order to achieve the objectives of learning by doing, an appropriate model should be provided. The duration of the activities should be adjusted in accordance with the teaching and learning context of the learners. Emphasizing the important points according to the design thinking process without omitting the learning skills and the body of knowledge

of the course is recommended. Lastly, from the results of this research, the researcher would like to state some suggestions for the study as follows.

1. Educational institutions should support teaching and learning method that gives learners more opportunities to learn in real situations in order to strengthen the competencies and skills of the future needed by the learners.
2. More research work should be encouraged to increase innovation according to design concepts seriously in order to create good and valuable products that learners could apply to their careers in a sustainable manner.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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