Design Thinking as an Educational Innovation Way: A Case Study of Design for Change Taiwan (DFC Taiwan)

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Abstract: A skills gap from theoretical knowledge to practical application is always a critical issue in Taiwan's education field. The launch of 12- year Basic Education Curriculum and the emergence of the educational innovation industry arouse the awareness of project-based competency-oriented curriculum design. Introducing design thinking into the educational field has received significant attention in recent years owing to the fact that the characteristics of design thinking track with a similar vision of the" core competency" listed in the 12- year Basic Education Curriculum, including emphasizing on exploring and doing, interdisciplinary integration, and the real-world scenario. This research takes the "Campus Ambassador Program" held by Design for Change Taiwan (DFC Taiwan), an educational innovation organization, as a case study. The method of semi-constructed in-depth interview is selected to gather the information from the student teachers of the program's participants as well as the staffs of DFC Taiwan who are responsible for this program, in order to know the effectiveness of the student teachers' design thinking education program.

Keywords: 12- year Basic Education Curriculum, educational innovation, design thinking, student teacher education program

Introduction

Recent years have seen increased attention being given to future competencies in several pieces of literature. According to the World Economic Forum's Future of Jobs Report (2020), the top five competencies required in the future are respectively analytical thinking and innovation, active learning and learning strategies, complex problem-solving, critical thinking and analysis, and creativity, presenting almost 50% of employees will need to re-develop their skills by 2025. There is a skills gap from theoretical knowledge to practical application, which leads to the insufficient of talents become one of the critical problems in Taiwan (IBM, 2018). Over the last few decades, various issues of significance have emerged, leading to substantial changes in the social and economic phenomenon, such as population aging, attention to ecologically sustainable development, and rapid development of technology. Due to the uncertainty, what a school can prepare for children are the jobs which haven't exist, the technology which hasn't been invented, and the social issues which haven't emerge (OECD, 2018). The increasing mobility among countries and the integration of various culture, human beings in this

global village require a brand-new way to communicate and cooperate with each other (European Commission, 2018). Education is the primary channel to make the goals of sustainable development been achieved, which bear the burden of delivering the knowledge and skills to the expected future (Giangrande et al., 2019). The educators, education experts, and the educational leaders are compelled to practice in complex conditions and ever changing environment (An, 2020, 2021; Basuhail, 2019; Gentile & Oswald, 2021; Robertson & Webber, 2002), in order to support students sufficient competencies to succeed in work, life and citizenship (Battelle for Kids, 2019). The issues mentioned above not only bring challenges to education but also displayed that it's essential to make the educational system keep pace with the global trends and social needs (Ministry of Education, 2014).

The Launch of 12- year Basic Education Curriculum in Taiwan

In order to cultivate the ability to solve future challenges, the Ministry of Education in Taiwan launched the 12-year Basic Education Curriculum in 2014 and activated in 2019, which claimed the new visions with core competencies as its highest priority. According to the new guideline of education curriculum, these core competencies can be divided into three broad dimensions and nine items, with the spirit of lifelong learning (Ministry of Education, 2014). These three basic dimensions, namely, spontaneity, communication and interaction, and social participation, respectively includes three items as the more detailed skills (See Figure 1). For spontaneity dimension, it involves physical and mental wellness and self-advancement, logical thinking and problem solving, and planning, execution, innovation and adaptation. Next, communication and interaction dimension entails semiotics and expression, information and technology literacy and media literacy, and artistic appreciation and aesthetic literacy. Last, social participation contains the concept of moral praxis and citizenship, interpersonal relationships and teamwork, and cultural and global understanding. The concept of competency can be formally defined by Ministry of Education (2014) as "core competency encompasses all information, ability, and attitude that a person should possess to equip him or her for daily life and for tackling future challenges."
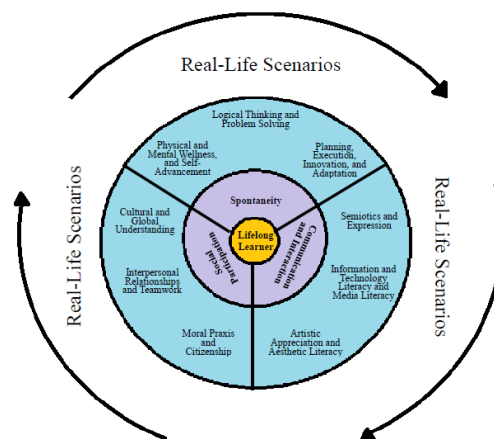

Figure 1. Wheel-in-action Diagram of Core Competencies
(Source: Ministry of Education in Taiwan, 2014)

Core competencies, as the central basis of curriculum development for general education domains and subjects, are adopted to ensure continuity among educational stages. This new guideline pays attention to competency-oriented teaching and focuses on the combination of learning and living. Transfer of learning occurs when students transfer the learning in school to the future learning process and impact their performance in another context (Perkins & Salomon, 1992). Only when transfer learning exists, students equip the abilities to solve problems in real life (陳雅慧, 2019). The primary goal for equipping core competencies is to make every student encompass the knowledge, abilities, and attitude to adapt to a rapid-changing world and conquer the difficulties in the future (Ministry of Education, 2014). Under the vision of the new guidelines, teachers are expected to equip with the abilities to establish a project-based framework of courses integrating different subjects (范正祥, 2020). Teachers have to develop cross-disciplinary and project-based hands-on learning content to cultivate students' skills of integrating their learning and applying them into real-world situations (Ministry of Education, 2014).

Design Thinking as an Educational Way

Over the past few decades of research on innovation methods, a number of approaches emerges with the purpose to satisfy the demand of increasing interdisciplinary cooperation under the rapid-changing world. Design thinking, as one of the innovative approach, appears and make its way to operate in all industries (Arkin Efeoglu1, 2013). Act as a concrete framework working on wicked problems (Rittel & Webber, 1973), design thinking integrates and applies the knowledge through actual practices and interdisciplinary grouping, with the aim of solving current issues (Noweski et al., 2012). The concept of wicked problems is raised by Horst Rittel (Rittel & Webber, 1973) with the statement "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing." (Buchanan, 1992). Based on the nature of embracing challenges, design thinking enables innovation to replace strategic management as an approach to tackle the wicked problems in the complex society (Brown & Wyatt, 2010; Johansson-Sköldberg, Woodilla, & Çetinkaya, 2013). An interdisciplinary team and project-based design work, therefore, become the key characteristic of design thinking, which as well as represent the feature that design thinking is opened for those without a design background (Brown & Katz, 2011; Dunne & Martin, 2006; Johansson-Sköldberg et al., 2013; Scheer, Noweski, & Meinel, 2012).

David Kelley proposed that a "design-thinker" involves eight core design abilities which is indispensable to solve the complex problems in creative ways within Design Thinking methodology (IDEO U, 2020). These eight abilities refer to the primary competencies as a creative problem solver (See Figure 2): 1. Navigate ambiguity; 2. Learn from others (people and contexts); 3. Synthesize information; 4. Experiment rapidly; 5. Move between concrete and abstract; 6. Build and craft things intentionally; 7. Communicate deliberately; 8. Design your design work. The above abilities are all about how a designer tackle real-world issues by discovering the phenomenon through the interaction with the world, analyzing current situation and data,

conducting the experiments practically, and evaluating possible outcome. These characteristics of design thinking track with a similar vision of the core competency, especially the concept of learning through experience within the authentic tasks, building knowledge through interaction with external contexts (Noweski et al., 2012; Scheer et al., 2012).

Figure 2. The 8 Design Abilities of Creative Problem Solvers

(Source: IDEO U, 2020)

From instructor perspective, teachers as facilitators to help different students go through their individual learning process by establish a learning scaffold. Considering students' participation and engagement, teachers can design the learning experience to motivate students through selecting the theme related to their interests or background (Noweski et al., 2012; Scheer et al., 2012). Under Design Thinking process, teachers need to offer timely supports and create a suitable learning atmosphere to students. Therefore, one of the effective ways to introduce design thinking into education will be arming the existing teachers and student teachers with the abilities to adopt design thinking. Some of the educational innovation organizations have tried to create the possibilities to induce the training programs for teachers with the hope to empower teachers to equip skills to teach interdisciplinary project-based courses.

The Emergence of Design Thinking Educational Innovation Organization

Educational innovation is to provide better educational services in novel ways to achieve educational goals, and it is also the practice of creativity (林偉文, 2019). OECD (2017) presumed that educational innovation organizations are those whose aim is to improve the provision of education through different approaches, including: 1. New products and services, such as new syllabus, textbooks or educational resources; 2. New processes for delivering their services, such as e-learning services; 3. New ways of organizing their activities, for example communicating with students and parents through digital technologies; 4. New marketing techniques, such as differential pricing of postgraduate courses. Educational innovation organizations can be viewed from different aspects. First, the organizations are broadly referred to as education-related groups, such as schools, training centers, universities, education publishers, and teaching communities. Next, from the perspective of the field to practice, educational innovation can be practiced in classrooms, specific activities,

online groups, certain organizations, the whole education system, and society. When it comes to the form of educational innovation, it may occur in not only formal education but also informal education (林偉文, 2019).

Design thinking can be viewed as a new teaching process or a new teaching way within educational context. Under the trend of educational innovation, some of the design thinking organizations gradually put their stress on the industry of educational innovation. The K12 Lab program, originated from d.school at Stanford University, is a teacher-training project which aims to teach teachers an innovative pedagogy to engage every student with creative and inspiring learning experiences. With the vision to alleviate educational inequality, repeal the opportunity gaps, and ensure an inspiring learning experience, The K12 Lab provides educational activities such as workshops, events, and resources for the global K-12 educators and teachers. Design for Change (DFC) is an international organization that aims to equip children with the abilities to be aware of the world around them, take action for certain issues, and be empowered to design a sustainable society. Design for Change Taiwan (DFC Taiwan), the national affiliate of Design for Change World (DFC World), aims to make the impact of changing children's mindset in Taiwan. Along with the vision of DFC World, DFC Taiwan believes that every child will be willing to face the future challenge by using the simple four steps formula originated from design thinking. Bringing new curriculum design methods and novel pedagogy into schools, DFC Taiwan provides Taiwanese educators to facilitate their students to make a transformation from empathizing with the surrounding to taking real social action.

Method

Case Introduction: Design for Change Taiwan

Design for Change Taiwan (DFC Taiwan), as a typical example of educational innovation organizations, devotes to help children become creative, proactive, empathetic and responsible citizens. As the national affiliate of Design for Change World (DFC World) which is founded by Kiran Bir Sethi in 2001 at India, DFC Taiwan followed a simple four steps formula– Feel, Imagine, Do, and Share (FIDS) –to make every child establish "I CAN" mindset (Design for Change, 2020). Following the FIDS design process, which is one of the design thinking frameworks, children will get through multiple trials and errors from empathizing with the world around them to coming up with several new solutions. Through the "Design for Change Challenge" which is held around the world, it has solved more than 18,000 problems in more than 40 countries, 48,000 schools, more than 60,000 teachers and 2 million children worldwide in only 7 years. Most of the affiliates of DFC are operated by the name of social enterprises or non-profit organizations. DFC Taiwan, established in 2010 and operated by a non-profit organization, has solved more than 800 problems conducted by more than 300 teachers and 3600 children till 2019.

In addition to the support for children, DFC Taiwan has conducted teacher training program in order to empower teachers and build the bridge between design thinking as constructivist learning pedagogy and teachers in schools. Through bringing new curriculum design methods and novel pedagogy into schools, DFC

Taiwan has cooperated with the domestic elementary schools and secondary schools to hold more than 500 speeches and 500 workshops in schools. In addition, DFC Taiwan has developed the "Seed Schools Project (種子學校計畫)" and cultivated the "Seed Teachers Certification Program (種子教師培訓計畫)" as a way to introduce design thinking methods into the formal schools. Through long-term training and support, DFC Taiwan helps the traditional school system to transform into a project-based, interdisciplinary, competency-oriented learning environment. In recent years, DFC Taiwan collaborates with the National Taipei University of Education and operate the "Campus Ambassador Program (校園大使計畫)", which aims to develop student teachers training system. Under this program, the participants will receive training and supervision from DFC Taiwan to design curriculum structure and develop suitable pedagogy on the basis of design thinking.

Overall, DFC Taiwan is an educational innovation organization that takes the design thinking process as the constructivist learning methods to develop the project-based curriculum design for all the educators and students in Taiwan. This study will focus on the program of student teachers training, that is, "Campus Ambassador Program" held by DFC Taiwan, due to the dual role at student and teacher simultaneously, which are able to take a holistic view on training process. Furthermore, every participant of Campus Ambassador Program will accept the assessment from DFC Taiwan in order to evaluate the effectiveness of learning, which offers the evaluation mechanism of design thinking curriculum design.

Research Method

To investigate how design thinking evaluation mechanism is worked to assess the learner's performance, the study was designed based on a qualitative approach to data collection. With qualitative method research, it provides the opportunities to describe a phenomenon in context and explore the in-depth insight into the complex problems (Baxter & Jack, 2008). The researcher uses qualitative method to understand how their target audience experience the world. By collecting their opinions, concepts, and experiences, the researcher is able to gather the deeper perception or generate new ideas (Pritha Bhandari, 2020).

This study takes case study and semi-structured in-depth interview as the data collection methods. Case study approach was selected in this research due to its features that gaining concrete, contextual, in-depth knowledge from a certain subject in real-world phenomenon (Shona McCombes, 2020). As the only non-profit informal educational innovation organization that introduce design thinking pedagogy into elementary schools, DFC Taiwan embeds the unique position. The Campus Ambassador Program can be described as a special project because it focuses on equipping student teachers with the capabilities to design a project-based competency-oriented curriculum and constructivist learning pedagogy based on design thinking methodology. Therefore, taking DFC Taiwan as a case study is helpful for the research to investigate the in-depth insights and generate new ideas from the exploration of the selected program.

As one of the qualitative research methods, the in-depth interview approach is a technique that aims to discover

the perspectives and opinions on a certain program, issue, or feature from an individual or a small number of participants (Boyce & Neale, 2006). Through conducting intensive interviews, this data collection method provides opportunities to gather abundant non-numerical information on people's perspectives and behaviors (B2B International, 2020). Semi-structured interviews, between structured and non-structured interviews, are the in-depth interview with a freedom structure that the researcher will preset open-ended questions for the respondents but also propose the associated non-prepared problems during interviews (Jamshed, 2014). The researcher allows for a discussion with the participants without strictly following formalized questions, which encourage two-way communication in order to gain a comprehensive understanding of the participants' opinions (Alison Doyle, 2020). Under the interviews with the staff of DFC Taiwan as well as the participants of the Campus Ambassador Program, the researcher can collect qualitative data on their point of views and behaviors with the aim to dig deeper insight from the non-numerical information.

Results

Interview Structure

This research was conducted to interview the staff of DFC Taiwan and the student teachers participating in the Campus Ambassador Program with the purpose to get more information on design thinking courses planning and evaluating and the feedback of these design thinking courses. The total four interviewees are as follows (Table 1): first is Ms. Deng, The person in charge of the Campus Ambassador Program in DFC Taiwan. She is in charge of the administration of the Campus Ambassador Program and also designs the curriculum for the participants of this program, which will offer information about design thinking curriculum design. The second and Third interviewees are Ms. Sun and Ms. He, the student-teacher participants of the Campus Ambassador Program. They represent the opinion and feedback from the trainees of design thinking courses, which will provide the information of learning results of the design thinking training program.

Table 1. Interviewee Profiles

Name	Job Title	Description	Interview Date
Ms. Deng	Member of Curriculum Service Team in DFC Taiwan	The person in charge of the Campus Ambassador Program in DFC Taiwan	2021, 02/01
Ms. Sun	Student in National Taipei University of Education, major in Special Education	Take part in the student-teacher program and participate in Campus Ambassador Program	2021, 03/13
Ms. He	Student in National Taipei University of Education, major in Education	Take part in the student-teacher program and participate in Campus Ambassador Program	2021, 03/15

With the aim to understand the detailed expected learning goals, evaluating mechanism, and the lesson plans for the student teachers who participate in the Campus Ambassador Program, the researcher categorized the

interview questions into three parts, which are desired results, assessment evidence, and lesson planning (See Table 2). The same interview questions will be asked in each phase of FIDS.

Table 2. Curriculum Design Interview Questions

Desired Results	In this course, what do you expect students to understand, to learn, or to be able to do after learning?
	What elements need to be learned by students?
	How will we know if students have achieved the desired results?
Assessment Evidence	How will we evaluate student performance and what are the evaluation criteria?
	What will we accept as evidence of student understanding and their ability to use (transfer) their learning in new situations (the "proof of acquisition" ex: learning sheet, experiment history, paper and pencil test, etc. that students can provide)?
Lesson Planning	Based on the desired results and assessment evidence mentioned above, what are your planned curriculum design and teaching methods (the current curriculum content and pedagogy)?

In order to examine the learning transfer results and the effectiveness of design thinking education provided by the selected case, the researcher collects the viewpoints on the training courses of the student teachers. Based on the desired results answered by DFC Taiwan in the previous, the participants' "learning results evaluation" and the "lesson plan application and practice" will be explored to evaluate their understanding of design thinking. The interview questions will be divided into two parts. The same interview questions will be asked in each phase of FIDS (See Table 3):

Table 3. Participants' Feedback Interview Questions

Learning Results Evaluation	Do you think you have acquired the ability mentioned by DFC Taiwan?
	Where did you acquire this ability?
Lesson Plan Application and Practice	After acquiring this ability, how did you teach other students this ability? (How to apply on or design the curriculum?)
	Please share the course you have designed.

Data Analysis

From the interview with Ms. Deng, the person in charge of the Campus Ambassador Program in DFC Taiwan, the researcher can collect the information of program introduction as well as design thinking curriculum design. In this Campus Ambassador Program, most of the participants are sophomores and juniors. All the participants should make their own lesson plans for elementary school students under the DFC context as their final results.

After the training program, there will be expected to hold a winter camp for participants to teach the elementary school students in Taitung county, which is canceled due to the COVID-19, however. In this training program, DFC Taiwan hopes to establish a kind of mindset in the participants' mind and then integrate design thinking into the curriculum. The participants will go through the full version of design thinking, which follows the 5-step version from IDEO company, and then start to learn the 4-step version of DFC Taiwan.

As mentioned above, the interview with the staff of DFC Taiwan will follow the structure of desired results, assessment evidence, and lesson planning. Table 4 has presented the interview results on each phase, which provides substantial information about the detailed curriculum arrangement of the Campus Ambassador Program.

Table 4. The Summary of the Response from DFC Taiwan

Feel phase

Desired Results	· The concept of human-oriented, which is to understand users' demands and solve the problems with the users
Assessment Evidence	· The interview questions listed by the participants.
	· Observe students' performance based on the interview process and iteration process.
	· Evaluate their "POV" sentence and insight.
Lesson Planning	· 1st: Introduce the topic, get to know all the possible problems, and let the students share their feeling about the given topic.
	· 2nd: Let students discover the possible problems and think from multiple perspectives through asking questions and using different design tools, such as empathy map and analysis of personnel, time and feature.
	· 3rd: Remind students to focus on human-oriented concept and do interviews and observation.
	· 4th: Converge the possible problems through the interview data and define the key problem. Create their own "POV sentence".

Imagine phase

Desired Results	· Creative confidence, creativity, and delayed criticism
Assessment Evidence	· Observe students' behavior during the discussion process.
	· Evaluate students' brainstorming results.
	· Observe the situation and atmosphere of teamwork.
	· Examine students' lesson plan.

Lesson Planning	· Create and let students experience a comfortable conversation environment through some activities, such as Story Solitaire.
	· Set up a discussion rules during the ideation phase.
	· Set up the goal and POV sentence.
	· Brainstorming in stages.
	· Set up idea selection criteria.

Do phase

Desired Results	Work division and action planning
Assessment Evidence	· Observe whether the team finishes the lesson plan in time.
	· Observe the situation of homework submission.
Lesson Planning	· Team building activities.
	· Three phases:
	1. Planning period: ask team members to think about how to plan the follow-up actions and what else should be complete before the deadline. Teach them how to use the given form to arrange their actions.
	2. Execution period: use " Work Division Manual" to teach students how to divide the work effectively and how to support each other member. Students have to finish their own manual by answering the following three questions: how can you communicate/cooperate with me, which cooperation way I prefer, and the way I'm used to expression.
	3. Closing period: use "feedback capture grid" to collect the feedback from target users by recording the points they like, the points they suggest, the points they're confused about, and the points they're surprised.

Share phase

Desired Results	Expression and the tips to give a speech
Assessment Evidence	· The results of their sharing
	· Whether the students care about their audience category.
Lesson Planning	· Prepare the Exhibition of Learning Process Achievements.
	· Guide the students to organize their own learning process portfolio.
	· Assist students in practicing how to give a speech.

From the interviews with Ms. Sun and Ms. He, the participants of the Campus Ambassador Program, the researcher can collect the information of the learning results and lesson plan application and practice under this program. Table 5 has organized the participants' feedback on each phase, which offers the evidence of learning

effectiveness on design thinking training program.

Table 5. The Summary of the Response from the Program's Participants

Feel phase

Learning Results	The participants learned the concept of human-oriented and acquire the abilities to understanding users' needs and empathize with others' situations.
Lesson Plan Application and Practice	The children's cognition is one of the main points when designing the lesson plan. The lesson of the Feel phase will go through a warm-up activity, doing field research, making a feeling map, making the analysis of personnel time and feature, doing interviews, giving feedback, making an empathy map, and define their point of view (POV).

Imagine phase

Learning Results	The participants enjoy the brainstorming process and are more willing to share different ideas and embrace the ideas from different perspectives.
Lesson Plan Application and Practice	The participants prepared several methods of association and also the rules of ideation to conduct the brainstorming activities.

Do phase

Learning Results	The participants have already acquired the abilities of work division and action planning, but they also agree that these abilities are strengthened through the training. In addition, the participants also acquired the methods of leading other people to divide their work.
Lesson Plan Application and Practice	Based on the forms and study sheets introduced by DFC Taiwan, the participants will use them to guide the children to explore each other's advantages. Besides, the concept of the prototype is introduced to the children in an understandable way.

Share phase

Learning Results	The participants think that the abilities of expression and the tips to give a speech are cultivated while they grew up, but they also agree that these abilities are strengthened through the training.
Lesson Plan Application and Practice	The user testing activity and the final presentation are carried out. An interview is selected to do user testing and a form of Feedback Capture Grid is given to the children.

Discussion

Based on the information collected from the staff of DFC Taiwan and the participants of the Campus Ambassador Program, the researcher discovered some confusing points and structural problems through the conducted interviews. This section will illustrate the key core issues which are highlighted by the researcher according to the collected data.

For the structural problems, according to the interview data, apparently, it is difficult to evaluate individual performance in this design thinking training program. Due to the fact that this program takes a group as a unit to conduct its lesson activities, the assessment evidence provided by the participants will be the result of teamwork instead of personal work. This problem can be traced back to one of the natures of design thinking, which is interdisciplinary collaboration, as well as project-based course design. Second, there are no certain evaluating criteria that can be measured. The result of collected data shows that the assessment evidence in each course is from the listed interview questions, the observation of discussion situations, the brainstorming results, and the result of the presentation, which is subjective and vague. It is hard to decide whether the outcomes made by the participants are correct or not owing to the fact that there is no right answer under the design thinking context.

From the lesson plan application and practice which is designed by the participants, it can be observed that most of the course activities follow the arrangement of DFC Taiwan. The participants tend to use the tools and forms introduced by DFC Taiwan to their own lesson plan, which result in the high similarity between the course design by DFC Taiwan and by the participants. This situation represents the possibility that it is challenging for the participants to design their own lesson plans even though they have acquired the abilities of design thinking. In addition, according to the interview result, each participant takes responsibility for a certain part of the lesson plan based on their work division, which leads to a fragmented understanding for the participants because they won't take care of other parts of the lesson plan. The participants are not familiar with their teammate's lesson plan although they design the activities for the same course.

For the confusing points, the researcher has gathered the information from the participants in each course. Owing to the fact that the objective of the Campus Ambassador Program for the participants is to teach elementary school students under the context of design thinking, they are asked to design the lesson plan with the aim to cultivate the children's basic abilities of design thinking. However, the gap in cognition between the adult and the children results in the importance of understandable language. The fact can be seen from the participants' feedback that they are uncertain as to whether the children can understand the message they deliver as well as the concept they teach. Additionally, it is difficult to predict the children's behavior because the participants have no experience in teaching students in elementary school. Although there will be a user testing stage for the participants to review and adjust their lesson plans, the tested users are not real elementary school students but the staff of DFC Taiwan. Therefore, the simplified instruction and the interpreted concept of design thinking might become the core elements while designing the course for the children.

Conclusion

As the only non-profit educational innovation organization which focuses on introducing design thinking into education, DFC Taiwan has a special role in Taiwan's educational system. With a simple four steps formula, DFC Taiwan devotes itself to make every child establish an "I CAN" mindset that children will get through multiple trials and errors from empathizing with the world around them to coming up with several new solutions. Not only the support for children, but DFC Taiwan has also conducted a series of teacher training programs in order to empower teachers and build the bridge between design thinking and teachers in schools.

This research takes the "Campus Ambassador Program", which aims to develop student teachers' training system, as a case to study the effectiveness of design thinking training program. The case study approach and semi-structured in-depth interview are selected as the data collection methods with the aim to get deeper information from the interviewees' perspectives. The research results show affirmative responses that the participants hold a positive attitude toward the design thinking training program. Based on the desired results raised by DFC Taiwan, the opinions from the participants represent that the abilities of design thinking are cultivated, which means that DFC Taiwan effectively introducing design thinking to education to a certain degree.

However, due to some limitations and structural problems, the simplified instruction and the interpreted concept of design thinking might become the core elements while designing the course for the children. The researcher hopes that this research can provide follow-up suggestions for those who pay attention to design thinking in elementary school while designing the curriculum for the children.

Recommendations

As mentioned above, individual performance is hard to evaluate in a group project. Although it is proved by the feedback of participants that they have acquired the corresponding abilities, it's challenging for teachers to control their lecture's tempo and follow up planning. Besides, the researcher cannot ensure that the participants had truly developed the abilities or not owing to the fact that there are no certain evaluation criteria for participants to check whether they have learned the concept. Based on these potential issues, it's recommended to pay attention to the assessment methods of individual performance under the group project in future work.

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