



# FACILITATING SUSTAINABLE DEVELOPMENT OF PRESCHOOLS: A SYSTEM THINKING TRAINING PROJECT IN TAIWAN

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## Abstract

*This study aims to assist preschools in achieving sustainable development by providing system thinking training for teachers and administrators. By promoting system thinking and PDCA, training helps preschool staff and teachers construct their knowledge and culture for organizational growth and effective operation. The research procedure encompasses stages of preparation, knowledge diffusion, knowledge adaptation, and establishing support networks. A total of 744 training participants engage in case studies, discussions, and self-evaluation activities to enhance their understanding and application of the PDCA framework. Quantitative and qualitative methods are used to collect the research participants' perceptions and intentions on this training. Research data is collected using 5-point Likert questionnaires, supplemented with open-ended questions to gather participants' perceptions and suggestions. In addition, qualitative data is obtained through onsite observation, focus groups, and individual interviews. The research results indicate that participants in the training program positively perceive the training activities. Also, those with administrative roles and from non-profit preschools exhibit higher interest and motivation for training, reflecting the need for sustainability knowledge in changing environments.*

**Keywords:** sustainable development, system thinking, PDCA, preschool teacher, early childhood education

## Introduction

With the increasing concern about education quality, many countries initiated educational reforms to improve teachers' professional skills and administrative efficiency. Early Childhood Education and Care institutions face numerous challenges in the context of rapid change. In addition to external changes such as government policy and the education market, internal issues, including teachers' teaching capacity, values, attitudes, and learning goals, are crucial to educational practice (Omdal, 2018). Like preschools in other countries, Taiwan preschools are also facing rapid changes in institutional and social situations. Among the changes that have taken place in recent years, the first is the integration of kindergartens and care centres into preschools in 2002. The government has invested many resources in personnel training to integrate personnel's duties and qualifications from the education and social welfare systems. Second, the public's concern about the accessibility and quality of early childhood education.

Because of the increasing number of dual-income households and parents' awareness of the importance of early childhood education for children's development, the needs and concerns regarding the quantity and quality of public preschools and non-profit preschools have become an important issue.

The Taiwan Government has actively promoted various policies to enhance preschool quality based on the above factors. For example, workshops and onsite mentoring are provided to assist teachers' professional development. Also, training to lead preschools to enhance their administration quality actively supports the improvement of preschools' management quality. Furthermore, preschools are granted to employ university professors or practical experts to help preschools enhance education quality. Nevertheless, this improvement seems short-term effective. Although preschools' quality has progressed during the counselling program, preschool operation quality often returns to its original point once the program is completed. The success of the abovementioned promotion relies on the long-lasting effects of quality promotion. After various training activities, the problem remains as if teachers understand the relevant content, are willing to apply what they have learned in their jobs, systematically observe the application results, and continuously improve themselves. Thus, it is important to implement training facilitating preschools to establish a self-improvement system after the onsite mentoring program and operate effectively without external assistance. The crucial factor for preschools and their employees to continue self-improvement is related to system thinking. However, system thinking courses are missing in pre-service teacher education. With a considerable professional capacity level after college-level teacher education and rigorous certificate examination, preschool teachers in Taiwan commonly lack system thinking skills. Therefore, it highlights the importance of system thinking in the on-the-job education of preschool teachers and staff. Under this contextual background, this study launches these nationwide programs with support from the government.

### *Research Focus*

A traditional approach based on the one-shot best strategy for planning could no longer be valid in a complex and uncertain environment. Strategic planning and management have to be a permanent and dynamic process. As such, it must be a form of collective organizational learning, a process of individual and collective inquiry that modifies or constructs organizational theories in use (Argyris & Schon, 1996). Learning organization, based on system thinking, helps to enhance organizations' practices and to prosper in a dynamic and competitive environment. System thinking, characterized as a fifth discipline, evaluates management as a whole that adapts continually as it cooperates with individuals within its structure (Senge, 2006).

The Ministry of Education has initiated a preschool's systematic operation plan to create long-term effects on sustainable development. By promoting preschools' systematic operation with a learning orientation, this program assists preschool teachers in learning system thinking concepts. It later leads to organizational learning toward the sustainable development of preschools. System thinking, which was characterized as a PDCA (Plan, Do, Check, Act) framework initially developed by the quality control movement, was featured as an effective learning method during the strategic management process (Argyris & Schon, 1978). Thus, the main research focus is how to tailor training programs targeting different roles and needs in promoting system thinking.

### *Research Aim*

In this study, the in-service teacher training with system thinking and PDCA as the content introduced to the preschool teachers and administrators is conducted nationwide under

the government's support. More importantly, besides delivering the PDCA concept, promoting system thinking as the daily routine during school activities is crucial to achieving sustainable preschool development. To accomplish the outcome, the researchers design and implement teacher training stages to explore the success factors of fostering sustainable development at these schools after training.

## Theoretical Foundation

### *System Thinking and Quality Improvement*

As a means of seeing the system as an integrated, complex composition of many interconnected components, system thinking is currently used to deal effectively with various assignments and challenges in various areas (Senge, 2006; Shaked & Schechter, 2017). The system-thinking approach advocates viewing the issue as a whole and emphasizing the interrelationships among its components rather than the components themselves. System thinking examines systems holistically and focuses on how the system's constituent parts act together in network interactions for the whole to function successfully. Likewise, the systemic approach in education quality management by Lamanauskas (2023) emphasizes knowing about many interrelationships between the system components and even the relationships between the system and the environment. By implementing long-term, methodical, and systematic work for constant improvement, the educational institution can coordinate occurring quality management questions through inner efforts (Lamanauskas, 2009).

Schools that function as learning organizations have systems and structures that enable staff at all levels to collaboratively and continuously learn and put new learnings to use. This capacity for collaborative learning defines the process of organizational learning in schools (Silins et al., 2002). The practical framework for strategic organizational learning could be the PDCA cycle, commonly used as a problem-solving model in the context of quality management (Argyris & Schon, 1978; Argyris & Schon, 1996). According to this framework, quality improvement will be effective if improvements start with a good plan (P), activities necessary to achieve the plan are implemented (D), results are checked (C) to understand the causes of the results, and actions (A) are taken to improve the processes (Dahlgaard et al., 1995). The PDCA cycle assures and improves quality in education in order for teachers to constantly monitor and adjust the plan toward achieving their goals. Therefore, preschool teachers gaining management skills can develop themselves and execute their tasks to appropriately meet the demands of society (Brandt & Elkjaer, 2011; Moen & Norman, 2010).

### *The Levels of Organizational Learning*

Organizational learning means that members grow through interaction between individuals and members of the organization and achieve the common learning goals of the organization. Therefore, learning diffuses from the individual to the group and eventually to the whole organization. Some scholars make a more detailed distinction between the levels in terms of "learning ability change," for example, the single-loop, double-loop, and three-loop learning, as suggested by Swieringa and Wierdsma (1992); similarly, Argyris and Schon (1996) identify three levels of learning which may be present in the organization. The first level is single-loop learning, which consists of one feedback loop when the strategy is modified in response to an unexpected result. Learners connect actions with outcomes under the established organizational objectives, policies, and norms. The main learning focus is to examine the environment in which mistakes occur, thus enhancing internal resilience by linking the happenings to the standards.

In short, the organization members adjust the means and strategies to enhance organizational effectiveness, rarely causing radical change. The second level is double-loop learning, in which the values, strategies, and assumptions that govern action are changed to create a more efficient environment. With the revision of the organization's goals, policies, and norms, learners try to identify the cause of the problem and find possible concrete actions. The third level is deutero learning, which is "learning how to learn." Members of this level learn from past experiences of failure and find ways to improve the learning system itself. In other words, the organization's members have learned the self-learning cycle.

### *Communities of Practices and Teacher Professional Development*

Senge(2006) states that learning organizations learn by means of learning individuals, but individual learning does not guarantee the organization's learning, and organizational learning does not occur without individual learning. Therefore, a learning community for education facilitates teachers to engage in organizational learning. Through participating in education community activities, novice teachers will develop teaching practices during their engagement. The engagement of systematic collaborative discourse, reflection, and inquiry improves professional development and practice and contributes to teacher professional development. Collaborative crafting is positively related to performance, particularly for less experienced teachers (Leana et al., 2009; Nolan et al., 2013).

A community of practice generally can be defined as a group of professionals and other stakeholders pursuing a shared learning enterprise commonly focusing on a particular topic (Lave, 1993). Claiming the learning process is a form of participation in society, Lave and Wenger (1991) asserted that learners enter a community at the periphery and move closer to full, legitimate participation as they gain knowledge and understanding of the community's customs and rituals. The applications of the community of practice framework on teacher education can be examined across critical dimensions such as diverse membership, goals, and participatory framework. Furthermore, the community should provide opportunities for regular reflection and dialogue about those field-based experiences with people of varying levels of expertise.

Bell and Gilbert (1996) claimed that teachers will undergo social, personal, and professional development within a teacher-development program that includes support, feedback, and reflection. The community of practice establishes a learning community across levels of expertise rather than within them and provides the learners with collaborative inquiry models. It offers tremendous promise in achieving diverse expertise and impacting the field because this approach recognizes the many concerns related to belief, cultures, tacit knowledge, identity, and power that do not fall neatly into disciplines. Moreover, the experienced teachers share case studies and discuss the potential advantages and barriers to their environment to encourage colleagues to critically examine and refine past and current practice, taking into careful consideration the personal, pedagogical, societal, and ethical contexts associated with schools, classrooms and the multiple roles of teachers (Han, 1995; Knowles et al., 1994).

### *Teacher Professional Development Program Design Trends*

In recent years, the focus of teacher professional development has changed from informational to transformational learning. Rather than passive information recipients, teachers change their roles as active participants during training activities. Besides, the evaluation of learning results shifts from the comprehension of information from lecturers to the transformation of thinking. More specifically, in the relevant curriculum for professional development, preschool teachers are guided to change their way of thinking (Clarke & Hollingsworth, 2002).

Therefore, teacher training must be sophisticatedly planned and promoted beyond merely informational training.

How to design training facilitating transformational learning? According to an analysis of theories by Rohlwing and Spelman (2014), four recurring themes spiral through the various theorists: experience, reflection, dialogue, and context. In the design of the training program, individual teacher's work experience should be considered. The training activities provide opportunities for reflection and dialogue to increase teachers' professional development. Lastly, the knowledge to learn is connected to the educational field, and the urgency felt by learners will become the starting point to motivate learning (Reeves, 2009).

To assist the preschools in achieving sustainable development, the training aims to help preschool staff and teachers construct their own knowledge and culture for organizational growth and effective operation to achieve the program objectives by promoting system thinking. Based on the framework mentioned above, three kinds of training programs were planned as follows:

1. Training Lectures. The training lectures are to introduce the basic concept of PDCA and then lead the participants to understand how to adopt in their schools by case studies and discussion.

2. Workshops. In the workshops, more hand-on practices are emphasized. According to the goal of each school, the workshop lecturers lead participants to implement their plan to improve school quality or solve existing problems by adopting PDCA model. Also, the participants will check and discuss the plans of the other participants to offer suggestions for improvement.

3. Professional Communities. The professional communities aim to execute their plan and self-evaluate the progress with an assessment tool for education quality. Similar to the APECP (The Assessment Profile for Early Childhood Programs), the assessment used to be composed of six dimensions including administration leadership, resource management, family and community, safety and health, evaluation and counselling, as well as curriculum for education and care. At each meeting, participants present their plan and self-evaluation, the lecturers and peers' feedback and discuss alternative solutions.

## Research Methodology

### *Research Procedure and Participants*

The research participants included researchers, training mentors, and training participants. The research team consisted of three professors and three full-time research assistants. Professors of early childhood education and senior preschool teachers with administration experience were invited to serve as training mentors. Among the 46 experts agreed to contribute their expertise, 15 served as the lecturers. For training participants, preschool teachers first registered the preferred training sessions, and then the research team selected the participants. In total, 744 participants attended at least one of these training courses. The research procedure and participants at each stage are described as follows.

Stage 1: Preparation. This study started in January 2017 and ended in December 2018. Preparation work, including training design, mentors meeting, and administrative work, was conducted during the first ten months. After the first training session which started in October 2017, training mentors periodically met to adjust their lectures or mentoring according to feedback from the research team. The research and development process included the following steps: First, Documentary analysis: Taiwan had begun to develop guidelines for the system operation of preschool shortly before this project started. In order to implement the training scheme accordingly, the research team first analysed the existing data and revised the contents

to match the guidelines. Second, Expert consultation: Four expert consultation meetings were held, with a total of 46 experts invited to participate in the consultation to provide advice on training design. Third, Instructor training: 12 university professors and three preschool directors were invited to serve as lecturers. One lecturer training and three retraining sessions were held for 15 lecturers to maintain the consistency and quality of the training content delivered. Finally, Continuous revision: The content was constantly revised and adjusted in response to the feedback from lecturers and participants.

Stage 2: Knowledge Diffusion. At this stage, training was conducted in the form of training lectures. From October 2017 to December 2018, 15 training lectures were held at different cities distributed all over Taiwan. The one-day training lectures comprised six-hour lectures. Based on the 568 valid questionnaires, 234 (41%) were teachers with administrative duties, 314 (56%) were teachers, and 15(3%) were non-teachers. The activities included PDCA concept explanation, discussion on PDCA's application in teaching, and guiding participants to view and improve their teaching in established school norms systematically. Personal learning and single-loop learning were conducted. Participants were encouraged to express their concerns and expectations on adopting PDCA. Also, the feasibility and difficulties at different schools were discussed and shared. The participants reflected on the positive and negative impacts of carrying out this model.

Stage 3: Knowledge Adaptation. At this stage, training was conducted in the form of workshops. From January to August 2018, seven workshops were held in northern, central, southern, and eastern areas in Taiwan. Each workshop consisted of two-day activities, including lectures, case studies, brainstorming, and discussion. The main content included applying PDCA on the preschool operation, using the self-checking tool, and case analysis. The activities mainly focused on problem identification and solution discussion regarding the authentic situation. In the 12-hour workshop, the lecturers, who were previously trained and certified to lead the activities, spent much time explaining and practicing system thinking skills to solve preschool problems. Among 71 workshop participants, 45 (54%) were teachers with administrative duties, 23(32%) were teachers, and 3(4%) were non-teachers. There were approximately 8-19 participants in each workshop, with at least two participants from the same school engaging in the discussion of the systemic operational issues presented in the case, the participants reviewing the problems encountered by their school operations, jointly proposing solutions, and re-examining the rationality of the established norms of preschools.

Stage 4: Support Network. At this stage, professional communities were established to form support networks. Three professional communities were formed in the northern, central, and southern areas. The community members were selected either by invitation or by application. The number of members of each community was around 10 or 11. In total, 33 participants from 16 preschools participated in community activities. Among them, 21(66%) were teachers with administrative duties, and 11(34%) were teachers. From May to November 2018, each community held seven monthly meetings lasting for 3 hours. The meeting's goal was to design a three-year plan to improve the preschool quality for each participant. Led by an experienced training mentor, community members shared their school status and vision and discussed problems and solutions.

Additionally, an evaluation form on preschool curriculum and instruction quality was adopted as a tool to self-evaluate the community member's plan. The main content included applying PDCA on the six dimensions of preschool operation, using the preschool's self-checking tool, and discussing the improvement and setting the preschool future development plan. The activities mainly focused on action. After each community activity, the members brought the learned content and the discussion results back to the preschool to discuss and work together with all the members and then brought the results back to the community for discussion and examining the school's systematic functioning. At each meeting, participants

needed to make the corresponding improvement strategy, helped their colleagues change their thinking, reviewed the school objectives and the rationality of the existing norms, and finally, constructed a plan and corresponding systematization of the operation mechanism for the next school year. In addition to double loop learning and deuteron learning, learners tended to diffuse group learning to the organization.

### *Data Collection and Analysis*

In this study, 5-point Likert questionnaires, as Table 1 indicated, were used to collect the research participants' perception and intention on these trainings. In addition, two open questions were appended at the end of the questionnaire to collect training participants' opinions on what they have gained during the training and suggestions to improve the practice. To contextually understand the interaction, onsite observation, focus group, and individual interview were used to collect qualitative data and later transcribed to ensure that all content was accurately captured. A grounded theory approach as described by Strauss and Corbin (1990) and a constant comparative method (Glaser & Strauss, 1967) were utilized to discover relevant categories and the relationships. Three of the researchers on the team completed the bottom layers of analysis, and then continued to develop categories with the rest of the research team.

## **Research Results**

### *Training Participants Show Positive Perception*

After the training by lectures, the analysis of questionnaires indicates positive feedback from participants. The overall score is 4.48 on the 5.0 scale. Besides, many participants answer the open questions with positive feedback, including "have a basic idea regarding PDCA," "expect to share with my colleagues," "anticipate to adopt PDCA at my school," and "lecturers did a good job."

For the training by workshops, the score on satisfaction is 4.7. Also, the participants' feedback confirms the higher level of learning. Through sharing and reflecting on the existing working methods in preschools, participants admit a better understanding of the PDCA approach. Furthermore, they appreciate the cooperative learning among colleagues by commenting, "the cycle of PDCA is clearly understood after practice," "increase my confidence in practices," and "discuss with my partners to change the way we think, and to rethink the way schools work right now."

For the training by professional communities, the score on satisfaction is 4.67. By engaging in the community's experience and practical tasks, training participants need to bring back to their own preschools to discuss with colleagues, thus initiating the organization's members' joint participation. The feedback from participants of the professional communities confirms the importance of the PDCA approach through comments such as "PDCA concept should be included in the training for preschool supervisors" and "this project should be added to the national mentoring program in the future." Also, evidence indicates that preschool colleagues can jointly examine the rationality of the workplace's existing plans and are willing to formulate new strategies.

### *Administrative Participants Show Higher Positive Attitude*

A significant difference in reaction toward PDCA exists for training lectures. Among the 568 valid questionnaires from participants of training lectures, 231 are teachers with administrative duties, and 325 are teachers without administrative responsibilities. As Table

1 indicates, administrative training participants showed significantly higher scores than non-administrative on believing PDCA would improve curriculum and administration quality and be willing to apply to their work (question no. 3, 4, and 5). Accordingly, the training participants with administrative duties are eager to attend the advanced training because of believing in the usefulness of PDCA (question no. 6).

**Table 1**  
*Perceptions of Lecture Training between Administrative and Non-Administrative*

Question	Job type	N	AVG	SD	t	p
1. The lecturers expressed clearly	Administrative	231	4.61	.563	1.456	.145
	Non-administrative	325	4.54	.579		
2. This workshop helped to understand the content	Administrative	231	4.55	.622	1.360	.175
	Non-administrative	325	4.48	.596		
3. I believe that PDCA will improve the curriculum quality of preschools	Administrative	231	4.68	.537	2.679	.008**
	Non-administrative	325	4.55	.589		
4. I believe that PDCA will improve the administration of preschools	Administrative	231	4.65	.539	2.428	.016*
	Non-administrative	325	4.53	.575		
5. I am willing to apply the systematic concept to my work	Administrative	231	4.62	.553	2.718	.007**
	Non-administrative	325	4.49	.601		
6. I am willing to attend the advanced training in the future	Administrative	231	4.46	.696	2.269	.024*
	Non-administrative	325	4.33	.706		
7. Overall, this training met my expectations	Administrative	231	4.52	.671	0.966	.335
	Non-administrative	325	4.46	.626		

\*  $p < .05$  \*\*  $p < .01$



*Administrative Participants More Willing to Attend Higher-level Training*

Three kinds of training, namely training lectures, workshops, and professional communities, require the participants to spend one day, two days, and half-day monthly for consecutive seven months on training. In other words, teachers further attending the next longer training reveal their higher motivation. As Table 2 indicates, the percentage of training participants with administrative duties increases from training lectures, workshops, and professional communities stepwise. With responsibility and authority to change their schools positively, they are more willing to attend further training.

Consistently, they give the qualitative feedback and sign up for further training as the workshop, and the professional community confirms similar findings. Comments like "expect to have relevant courses in the future" were made by more than 85% of the administrative position participants. Also, those active requests for attending the professional community are all teachers with managerial positions. For practical reasons, learners can obtain skills and knowledge to solve on-the-job problems quickly, which is critical for busy preschool teachers and administrators.

**Table 2**

*The Number and Percentage of Participants with Administrative Duties at Each Training (N, %)*

Duties	Training Lectures	Workshops	Professional Communities
Administrative	234 (41)	45 (54)	21 (66)
Non-Administrative	314 (56)	26 (32)	11 (34)
Others	15 (3)	3 (4)	0 (0)
Total	563	74	32

*Training Participants Facing Changing Environment Showed Higher Motivation*

Although the higher-level training requires devoting more time and efforts, training participants' professional needs affect their motivation to attend higher-level training. As Table 3 indicates, the percentage of training participants from non-profit preschools increases from training lectures, workshops, and professional communities stepwise.

**Table 3**

*The Number and Percentage of Participants from Different School Types (N, %)*

Preschool Type	Training Lectures	Workshops	Professional Communities
Public	97 (39)	34 (49)	10 (31)
Private	129 (51)	29 (41)	10 (31)
Non-Profit	25 (10)	7 (10)	12 (38)
Total	251	70	32

Teachers of non-profit preschools claim that PDCA has become one of the performance evaluation items in the non-profit preschool supervision system. Thus, they expect to participate

in the training to apply the training content in the actual work. The non-profit preschool, a new type of organization sponsored by the government to exploit the early childhood education market, encounters competitive and challenging tasks. Consequently, non-profit preschool teachers show a higher motivation to attend the training than the other types of preschools. The reason is to acquire knowledge that can be immediately applied to the work in response to supervision and evaluation. In other words, the urgency of work is an essential factor in initiating learning.

## Discussion

### *Devotion to Training is Related to Preschool Workers' Needs*

In this study, stages of training on system thinking were conducted to facilitate professional development. Each stage triggered individual-based learning, peer-based learning, and group-based learning while diffusing influences to the participants' colleagues. From the participant's response, the professional community and workshops were higher than the training lectures on the overall satisfaction of the training, perception of usefulness for preschool work, and the willingness to adopt PDCA in work-related projects. In other words, the more the training participants devote themselves to the participation, the more the training can trigger active learning and the results. There are two possible reasons for this phenomenon. Firstly, from a practical community perspective, the support system within professional communities is a crucial factor in professional development. In this study, lecture participants only spent six hours and had a one-time participation without a corresponding support system. In contrast, workshops and community activities had longer durations and more robust peer support among participants. Therefore, the effectiveness of learning in workshops and communities is superior to that of lectures.

Secondly, from an organizational learning perspective, this study required participants in workshops and communities to invite at least two colleagues from the same preschool to join. In other words, participants in workshops and communities, whether in the process of system thinking training or practical implementation in educational settings, had professional peers. Thus, teachers could bring back the knowledge and skills of system thinking to their organizations, which is an effective way of learning (Swieringa & Wiewdsma, 1992). Additionally, the professional community in this study spanned seven months. Members had to report their progress in practical implementation during each community activity every month. Therefore, the knowledge and skills of system thinking were put into practice in preschools, and the process of practical implementation was a collaborative effort among teachers. In this process, relevant knowledge and skills were integrated into the organization, triggering the organizational learning levels, especially in areas where preschools lacked knowledge and skills, such as system thinking. This process may have elevated the organizational learning levels from what Argyris and Schon (1996) referred to as single-loop learning to double-loop learning, allowing teachers to break free from existing thinking frameworks within the organization, reevaluate the organization's resources and problems, and find appropriate strategies. As a result, they perceived better learning outcomes.

Also, teachers with an administrative position revealed a higher interest and expectation to obtain the organization's sustainability knowledge than teachers concerned with teaching activities. Several studies indicate that leadership in the fourth way of educational change is related to a systemic, sustainable development approach (Briggs et al., 2018; Hargreaves & Shirley, 2012). Similarly, non-profit preschool training participants showed the need to develop capabilities to survive in the changing and competitive environment. Furthermore, PDCA is also one of the items for organizational assessment in non-profit preschools by government, making this capability extremely important.

For school administrators, learning how to solve the emerging problems is highly desirable. Besides, in the context of administrative work in preschools, system thinking is more likely to be used and more effective, so this is understandable in the context's point of view as indicated by Rohlwing and Spelman (2014). From the perspective of in-service teacher education, learners are interested in 'just-in-time learning,' which promotes need-related training to be readily available for their job (Griddith et al., 2014; Kirkpatrick & Kirkpatrick, 2016).

### *Barriers to Promote PDCA at Schools*

Compared with primary and secondary school education, the preschool operation is relatively complex and challenging in quality control and management (Fonsen & Soukainen, 2019). While facing external challenges, preschool teachers and staff must work together and solve them effectively. However, with unique features and external pressure, preschool teachers' working environment has the following characteristics and barriers to promote PDCA.

First, decisional capital is essential but hard to build. Regarding the nature of teachers' work, it is necessary to make professional decisions in real-time according to the conditions on the spot. This capability is called decisional capital, acquired and accumulated through structured and unstructured work experience, practice, and reflection. Moreover, high professionalism needs long-term training (Hargreaves & Fullan, 2012). Parent involvement in young children's preschool education makes the situation more complex than teachers in other education stages. The requirement for professional capital at preschool is higher. Nevertheless, the reality is that preschool teachers' work environment is isolated. Spending most time with co-teachers, they have limited time to interact with other colleagues, which is not conducive to professional development (Mraz & Kissel, 2014).

Secondly, it is difficult to reach a consensus on adopting PDCA. Many participants revealed that the change would occur only if most of the colleagues agree to take action. Therefore, support from the administrators and teachers is essential. Getting support from colleagues and cooperative working is the primary factor for improvement in educational organizations (Melasalmi & Husu, 2019; Prenger et al., 2021). Without colleagues' cooperation and understanding, teachers would lack confidence and inspiration to change their work habits. School administrator's attitude also affects the movement. The support and assistance from managers for teachers' innovation and development would positively influence organizational learning.

Thirdly, there is limited human resource to promote PDCA. Work at preschools is fragmental and tedious. In terms of classroom activities, the work is full of trivial, long, but time-demanding tasks, which results in more fragmentary thinking and uneasiness in developing the habit of system thinking. Furthermore, a vicious cycle is formed to break through the difficulties and make the work efficient. Busy with their routine tasks, teachers and administrators cannot spare time filling out documents for the PDCA process. Under the limitation of labour, they face difficulties to adopt PDCA.

Fourthly, educational quality is not the priority because the preschool management pressure comes from recruitment. For many private schools, student recruiting is the ultimate goal. From the perspective of preschool management, curriculum innovation and business environment change rapidly in recent years, preschools need to respond to rapid changes in the outside world and adopt corresponding strategies accordingly in order to become competitive. Although education quality is the crucial component to pursue this goal, most teachers or administrators are not aware of the connection to school sustainability. Instead of working together with the administrators, they are seldom granted privilege to set or check a plan.

Finally, teachers depend considerably on external support or mentorship. Many training participants appreciate the leadership of the lecturers and expect to have periodical mentorship

afterward. However, these external resources providing both practical support and authority to guide the teachers cannot continue forever. The inner efforts for constant improvement are important (Lamanauskas, 2009; McLeod et al., 2019).

## Conclusions and Implications

Preschools' quality cannot be maintained without highly professional teachers. Failure to establish a sustainable mechanism for professional development results in a high percentage of talent loss. It makes the preschools gradually give up purchasing the goal of maintaining high-quality service. By introducing the concept of system thinking and self-checking tools, preschool teachers are provided with opportunities to reflect on their work plan and the rationality of the organization's existing operation and thus produce effective strategies in response to the outside world's changing situation. More importantly, preschool teachers will also generate self-confidence and agency, which will change their preschool work views and thus start a sustainable positive cycle.

In this study, the organizational-learning approach was adopted to plan a systematic professional development training that includes lectures, workshops, and professional communities. Each of the three courses triggers individual-based single-loop learning, group-based learning single-loop and double-loop learning, as well as double-loop and deuteron-learning while the group diffuses influences to the organization. From the response of the participants, the professional community and workshops are higher than the training lectures on overall satisfaction of the trainings, perception of usefulness for preschool work, and the willingness to adopt PDCA in work-related projects. In other words, the more the training participants devote themselves into the participation, the more the training can trigger high-level organizational learning and the results.

In addition, teachers with an administrative position revealed a higher interest and expectation to obtain knowledge needed for the sustainability of the organization than teachers who are mainly concerned about teaching activities. Similarly, training participants from non-profit preschool show the needs to develop capabilities to survive in the changing and competitive environment. From the teachers' perspectives, the 'just-in-time learning' content can support their needs immediately. Therefore, the trainings should be divided into sessions with different learning objects and thus leading to a separate content. For example, the training for teachers should concentrate on teaching practice with system thinking approach, while the examples and content for supervisors can focus on the handling of administrative matters.

From the perspective of organizational learning, supervisors play a significant role in initiating organizational learning. Coincidentally, this study found that supervisors hold a positive view toward PDCA approach and actively participate in learning activities, which is a good start for promoting organizational learning. Therefore, in the future training for the supervisors, more activities may be arranged to assist the supervisor to become a leader of organizational learning, who will rebuild the organization's objectives and culture, and eventually to achieve the goal of sustainable development.

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## Declaration of Interest

The authors declare no competing interest.

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