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DEVELOPING A CAREGIVER TRAINING CURRICULUM TO ENHANCE EARLY CHILDHOOD SAFETY SKILLS IN THAI CHILD DEVELOPMENT CENTERS IN NAKHON PATHOM PROVINCE

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ABSTRACT

The study responded to the need to strengthen caregivers' competency in providing learning experiences to promote early childhood safety skills (ECSSs) in child development centers affiliated with local administrative organizations in Nakhon Pathom Province, Thailand. It aimed 1) to develop a competency-based training curriculum for caregivers, 2) to verify the curriculum's effectiveness in enhancing caregivers' knowledge, ability, and experience provision plans, and 3) to investigate the possibility of expanding the curriculum for use in other centers. The study adopted four R&D stages of research, namely, baseline study (R1), curriculum drafting and verification (D1), effectiveness verification (R2), and curriculum revision (D2). Mean scores, standard deviations, and t-tests were employed in analyzing the quantitative data. It was found that the developed curriculum consisted of eight essential components: curriculum problems and importance, principles, objectives, contents, training activities, period, training materials, and evaluation. The training followed a structured five-stage model involving case study analysis, collaborative idea exploration, problem-solving, safety skill development, and presentation. After the training, the caregivers participating in the training program gained statistically higher knowledge and understanding of learning experience organization for child safety ($p < .01$), and their ability to prepare and carry out the learning plans was rated at a high to a very high level. The children in the centers also developed significantly improved safety skills to a high level after their caregivers' learning application of the training. The curriculum was successfully applied in two other child development centers, confirming its potential for adaptation and relevancy. The findings indicate that the curriculum effectively enhanced the caregivers' competencies and contributed to the promotion of ECSSs in child development centers.

Keywords: Early childhood; safety skills; training development curriculum

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1. INTRODUCTION

Early childhood is now widely understood as a sensitive period in which lasting health, learning, and well-being outcomes take root. Evidence from the health, education, and social science literature shows that many of the precursors of adult wellbeing and competence, and conversely poor health, ill-being, and dysfunction, lie in the developmental processes of early childhood (World Health Organization, 2018). Supporting these processes through environments that promote child health, nutrition, safety, and emotional development, prevent harm, and provide stimulating opportunities to learn is thus a global issue.

The World Health Organization's (WHO) Nurturing Care Framework (NCF) highlights the need for coordinated strategies that integrate the components of health, nutrition, responsive caregiving, safety, and early learning across multisectoral delivery systems (World Health Organization, 2018). Interventions that deliver some or all of these components have been shown to benefit child development. However, their adaptation, implementation, and scaling in diverse contexts raise questions about the localization of evidence-informed strategies and the maintenance of quality in delivery.

Thailand has also placed early childhood development (ECD) at the heart of its human development agenda. The Thirteenth National Economic and Social Development Plan (2023–2027) (Office of the National Economic and Social Development Council [NESDC], 2025) explicitly makes holistic development of children from the moment of pregnancy to the end of the preschool period a national priority. Likewise, Thailand's Early Childhood Development Plan (2021–2027) calls for improvement in the quality and standards of early childhood services, emphasizing coaching and mentoring for caregivers and teachers (Chatakan et al., 2024; Rodriguez & Chua, 2021). Both policy frameworks stress that building competencies in caregivers is critical for ensuring children are ready to succeed before entering school.

Despite such national pledges, daunting challenges remain, with Thailand's National Education Plan (2017–2036) expressing concerns that CDCs operate based on "fragmented standards issued by different agencies, resulting in uneven quality of services" (Office of the Education Council, 2017). Results of a nationwide assessment of 19,480 CDCs under local administrative organizations confirm this observation, reporting that most CDCs received only fair or reasonable scores, with caregiver qualifications and institution management and administration cited as areas requiring urgent improvement. Several complementary studies echo these findings, documenting problems in teachers' curriculum design, learning plan development, and instructional media production.

Interviews with ECD teachers in Nakhon Pathom Province revealed a pressing need to develop safety-related learning experiences, such as drowning prevention, road safety (Jullien, 2021), electrical safety, toy safety, communicable disease prevention, and protection from sexual abuse. These areas are critical, as accidents and preventable injuries remain the leading causes of harm among young children worldwide.

Although several Thai studies have developed training curricula for early childhood teachers (Chaemchoy, 2023), such as science learning based on brain-based approaches (Sangngam, 2021), and life skills for problem-solving, there is limited research focused explicitly on training caregivers to enhance safety skills. International literature highlights the importance of empowering caregivers with safety-focused competencies (Lindholm et al., 2022).

For example, Morrongiello and Dawber (2004) emphasized caregiver supervision and safety practices in preventing childhood injuries, while Schwebel and Gaines (2007) demonstrated the role of caregiver training in fostering children's self-protective behaviors. Similarly, Topping and Wolfendale (2017) underscored that caregiver professional development is essential to building safe, developmentally appropriate learning environments. Finally, Harvath et al. (2023) pointed out that 53 million family caregivers in the United States provide care to older adults. However, while they are crucial to the health care system, they are not adequately supported to serve as caregivers.

Therefore, this study aimed to develop a competency-based training curriculum for caregivers in CDCs (Sultan et al., 2025), under subdistrict administrative organizations and municipalities in Nakhon Pathom Province. By enhancing caregivers' ability to organize learning experiences that build children's safety skills (Baruni & Miltenberger, 2022), the study seeks to contribute to national policy goals and global evidence on strengthening early childhood care and education.

To address these issues, the research was guided by the following questions:

1. How can a competency-based training curriculum strengthen caregivers' knowledge and skills in organizing learning experiences for early childhood safety?

2. To what extent does the curriculum improve caregivers' knowledge, abilities, and planning of learning experiences related to child safety?

3. What impact does the training have on children's safety skills in CDCs?

4. How effective is the curriculum overall in meeting the standards of caregiver professional development and child safety promotion?

By framing the study in this way, the research responds to urgent local needs in Thai CDCs and contributes to international discussions on professional development for early childhood caregivers.

2. METHODS

This study employed a research and development (R&D) methodology comprising four phases:

2.1 Phase 1 - Baseline study (R1)

The authors conducted interviews with heads of CDCs and caregivers (n = 48) in Nakhon Pathom Province to assess the current status, problems, and needs regarding safety skill development (Ahun et al., 2023). A synthesis of relevant documents and literature informed the curriculum framework.

2.2 Phase 2 - Curriculum drafting and validation (D1)

A draft competency-based training curriculum was developed. Its quality and validity were assessed through a focus group discussion with five experts (Wang et al., 2025) in curriculum development, early childhood education, and measurement evaluation using structured assessment forms.

2.3 Phase 3 - Training curriculum effectiveness trial (R2)

The curriculum's effectiveness was tested with 48 caregivers from 13 centers in Nakhon Pathom Province, Thailand (Watanabe et al., 2019). The objectives evaluated included 1) caregivers' knowledge and understanding of learning experiences, 2) caregivers' ability to organize learning experiences, 3) evaluation of caregivers' learning experience plans, and 4) early childhood safety skills (ECSSs) (Baruni & Miltenberger, 2022). The research methodology consisted of four steps:

2.3.1 Step 1: Pilot study

This phase involved piloting the training curriculum developed by the researchers with nine non-sample caregivers to examine its feasibility. A suite of validated instruments was used: a 20-item multiple-choice knowledge test, a 17-item ability assessment (5-point scale), an 18-item lesson plan assessment (5-point scale), and a 50-item child safety skills assessment (5-point scale). The instruments included the training curriculum and a pre- and post-training test to measure caregivers' knowledge and understanding of organizing learning experiences. Data collection included measuring caregivers' knowledge and understanding of organizing learning experiences using the ECSSs Assessment Form. Caregivers' ability to organize learning experiences was analyzed using reliability, means, and standard deviations (SD).

2.3.2 Step 2: Curriculum trial with a sample group

Caregivers took part in the training program. Their knowledge, lesson planning, and ability to organize learning activities were tested before and after the training. They then implemented their lessons, and children's safety skill development was evaluated.

2.3.3 Step 3: Early childhood learning experiences organized by caregivers

In Step 3, caregivers from 13 Child Development Centers (CDCs) in Nakhon Pathom Province participated in 20-minute sessions. The researchers revised and improved the training curriculum using feedback from CDC heads and caregivers. A seminar with five experts was also held to review the curriculum for certification. These steps ensured the curriculum was comprehensive and suitable for enhancing ECSSs.

2.3.4 Step 4: Expanding the training curriculum

The expansion phase involved preschool children from two CDCs in Nakhon Pathom Province. Four instruments were used: (1) a 20-item multiple-choice pre- and post-test to measure caregivers' knowledge and understanding of organizing learning experiences, (2) a 17-item questionnaire on caregivers' ability to organize learning experiences, (3) an 18-item questionnaire evaluating caregivers' learning experience plans, and (4) a 50-item early childhood safety skills assessment form. Data collection followed these instruments in sequence: knowledge tests, ability assessments, plan evaluations, and safety skill assessments. Data analysis included testing the validity, reliability, difficulty, and discrimination for the knowledge test (t-test), while the other three measures were analyzed using reliability, means, and standard deviations.

2.4 Phase 4 - Curriculum improvement and development (D2)

The curriculum was finalized based on feedback from the trial and a final expert review seminar with experts.

3. RESULTS

3.1 Improving early childhood safety skills (ECCSs) through learning activities (R1)

This research investigated the current situation, problems, and needs regarding the organization of learning experiences that promote ECSSs through interviews with heads of child development centers and caregivers and a synthesis of related documents and research.

The heads of child development centers had a high level of knowledge and understanding regarding the concepts of safety-based design of learning experiences for children, clearly established goals and objectives of safety-based learning experience design, and the use of real accident situations as lessons. The selection of various media materials, including a traffic light simulation to help children become aware of potential accidents during learning activities, and observation were identified as monitoring approaches best suited to assessing children's safety behaviors. Prior knowledge from training and professional skills in accident prevention benefited teachers. However, they all indicated that staff caregivers and warning providers lacked knowledge and skills, expertise in the use of media and field experience, and a variety of methods for assessing information about children, as well as identifying additional needs in the areas of knowledge, skill training practices, characteristics, use of media resources, and integrated tools based on the five core elements for future safety-based learning experience design for children.

Caregivers indicated that they had knowledge and could develop experience-based activities. In particular, they were able to develop simulations and learning activities involving movement in the learning field, such as traffic safety and other accident prevention skills. They identified six areas of skills for preventing accidents, including road traffic injuries (Jullien, 2021), drowning (Jullien, 2021), electrical injuries, drug safety, toy-related injuries, and sexual abuse. They had positive attitudes toward training and reflected on their knowledge and practice. Nevertheless, they continued to experience problems related to falls, road accidents, and drowning among children, as well as gaps in knowledge and skills. Furthermore, they expressed their professional development and improvement needs, such as writing learning experience plans, questioning, media use, and activity design.

The document and research synthesis supported this, emphasizing the importance of caregivers' knowledge and skills in implementing safety skills (Schnitzer, 2006) and their positive attitudes toward safety education. Safety skills were defined as children's behaviors that prevent accidents in daily life, classified into six safety domains: road traffic, drowning, electrical, toy-related, communicable disease, and sexual abuse safety.

In general, these results signal that although caregivers and center heads are interested in safety education and gaining greater expertise from training, there are still considerable weaknesses in knowledge and skills (Bautista et al., 2021) and the evaluation domain. Offering targeted professional development opportunities for training will enable caregivers to effectively provide safety-focused learning opportunities to empower children to protect themselves from common accidents (Schnitzer, 2006).

3.2 Results of the draft training curriculum and quality review (D1)

The developed training curriculum to enhance caregivers' competency in organizing safety-focused learning experiences comprised eight components: (1) curriculum problems and importance, (2) principles, (3) objectives, (4) six learning units—road safety, drowning prevention, electrical safety, toy safety, communicable disease prevention, and sexual abuse prevention—, (5) five-step training activities (case study analysis, collaborative idea exploration, problem-solving, safety skill development, and presentation), (6) a 5-day, 36-hour training period, (7) training materials, and (8) curriculum evaluation. The final curriculum is summarized in Figure 1.

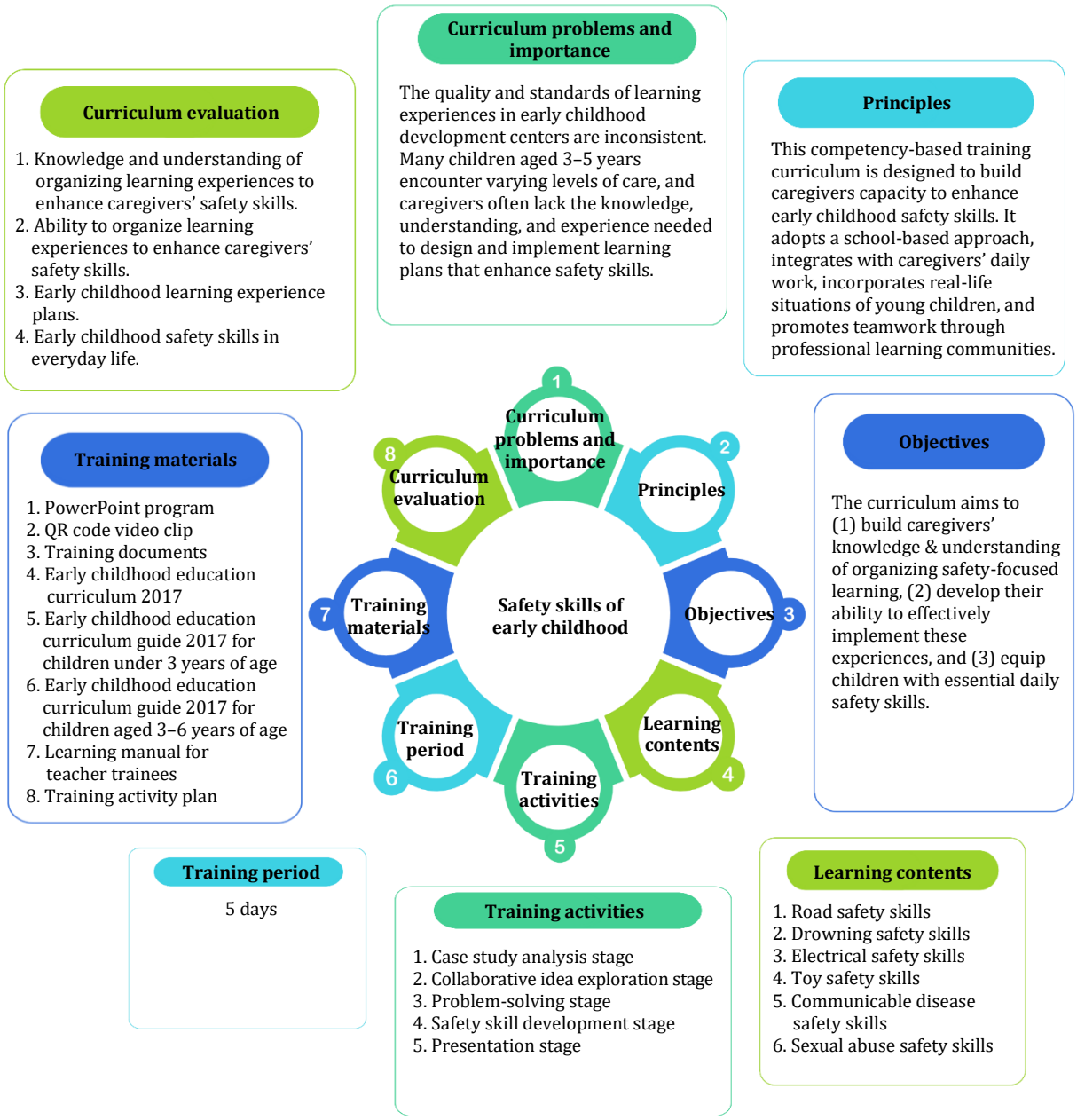

Figure 1: Draft training curriculum for early childhood caregivers' learning experiences that enhance ECSSs.

3.3 Results of the training curriculum effectiveness assessment (R2)

The results were divided into four steps as follows:

3.3.1 Pilot study results (n = 9)

Caregivers' learning outcomes indicated that the average scores of knowledge and understanding of organizing learning experiences of caregivers before and after the training were significantly different at the .01 level, with the scores after the training being higher than before the training (Table 1).

Table 1: Comparison of the mean scores of knowledge and understanding before and after the training

Knowledge score	n	Full score	M	SD	*t*	Sig
Pre-training	9	20	8.78	0.83	32.40**	.000
Post-training	9	20	14.22	0.67		

**significantly different at .01

3.3.2 Results of the sample group's curriculum trial

The trial showed that caregivers significantly improved their knowledge and understanding of organizing learning experiences after the training. As shown in Table 2, the average pre-training score was 9.27 (SD = 0.76) out of 20, while the post-training average increased to 15.23 (SD = 0.66). The difference was statistically significant at the .01 level (t = 75.84, p < .01), indicating that the training effectively enhanced caregivers' knowledge.

Table 2: Comparison of caregivers' knowledge and understanding before and after training

Knowledge score	n	Full score	M	SD	*t*	Sig
Pre-training	48	20	9.27	0.76	75.84**	.000
Post-training	48	20	15.23	0.66		

**significantly different at .01

3.3.3 Evaluation of caregivers' outcomes

The evaluation of caregivers' outcomes across 13 CDCs revealed that both their ability to organize learning experiences and their learning experience plans were consistently rated at high to very high levels. As shown in Table 3 (Step 3) and Table 4 (Step 4), mean scores for ability ranged from 4.20 to 4.86, while mean scores for planning ranged from 4.10 to 4.88. In caregiver ability, centers such as Ban Khlong Mai and Sisa Thong SAO, demonstrated particularly strong outcomes. While ratings in planning revealed that Wat Lamut and Ban Wat Bua had very strong scores. These results confirm that the training curriculum effectively enhanced caregivers' competencies not only in practice but also in planning, thereby contributing to improved ECSSs.

Table 3: Caregivers' ability in 13 child development centers

No.	Child development center	E1	E2	E3	M	SD	Levels
1	Ban Khlong Mai	4.89	5.00	4.70	4.86	0.15	Very high
2	Tha Tamnak	5.00	5.00	4.00	4.74	0.45	Very high
3	Thammasala SAO	5.00	4.85	4.70	4.81	0.14	Very high
4	Bang Khaem	4.27	4.19	4.15	4.20	0.09	High
5	Wat Lamut	4.85	4.81	4.75	4.80	0.12	Very high
6	Ban Wat Bua	4.74	4.94	4.70	4.79	0.14	Very high
7	Ban Lan Laem	4.85	4.86	4.70	4.80	0.12	Very high
8	Ban Nong Pak Long	4.29	4.47	4.11	4.29	0.23	High
9	Phatom Thong	4.67	4.75	4.56	4.66	0.11	Very high
10	Laem Bua SAO	4.85	4.90	4.66	4.80	0.14	Very high
11	Lam Phaya Municipality	4.85	4.92	4.47	4.75	0.30	Very high
12	Sisa Thong SAO	4.94	4.90	4.70	4.85	0.14	Very high
13	Map Khae Municipality	4.74	4.86	4.66	4.75	0.14	Very high

Evaluators: 1 = Scholar, 2 = Researcher, 3 = Early childhood education expert

Table 4: Caregivers' ability in 13 CDCs

No.	Child development center	Unit of learning (planning)	E1	E2	E3	M	SD	Levels
1	Ban Khlong Mai	Safety first	4.89	5.00	4.70	4.72	0.24	Very high
2	Tha Tamnak	Safety first	5.00	5.00	4.00	4.70	0.29	Very high
3	Thammasala SAO	Vehicle safety	5.00	4.85	4.70	4.70	0.26	Very high
4	Bang Khaem	Road safety	4.27	4.19	4.15	4.33	0.12	High
5	Wat Lamut	Road accident safety	4.85	4.81	4.75	4.87	0.20	Very high
6	Ban Wat Bua	Traffic lights and zebra crossings	4.74	4.94	4.70	4.88	0.10	Very high
7	Ban Lan Laem	Traffic lights	4.85	4.86	4.70	4.86	0.14	Very high
8	Ban Nong Pak Long	Road accident safety prevention	4.29	4.47	4.11	4.10	0.14	High
9	Phatom Thong	Road accident safety prevention	4.67	4.75	4.56	4.75	0.15	Very high
10	Laem Bua SAO	Drowning prevention	4.85	4.90	4.66	4.70	0.17	Very high
11	Lam Phaya Municipality	Drowning prevention	4.85	4.92	4.47	4.68	0.26	Very high
12	Sisa Thong SAO	Safety first	4.94	4.90	4.70	4.68	0.25	Very high
13	Map Khae Municipality	Road accident safety prevention	4.74	4.86	4.66	4.56	0.40	Very high

3.4 Results of the ECSS evaluation in CDCs

The results of children's safety skills assessment in 13 CDCs from Nakhon Pathom Province revealed high results in all CDCs (Table 5). Drowning prevention (M = 4.49, SD = 0.57) and communicable disease prevention (M = 4.43, SD = 0.53) were the areas with the highest skill scores, followed by road safety (M = 4.33, SD = 0.50) and toy safety (M = 4.31, SD = 0.58), which were slightly less but at a high level. In addition, sexual abuse prevention was the lowest-scoring skill (M = 4.19, SD = 0.55), but it also obtained high results. This finding suggested that the trained curriculum enhanced the sense of safety in multiple domains of ECD.

Table 5: Average scores of ECSS across 13 CDCs

Learning content	M	SD
Road safety skills	4.33	0.50
Drowning prevention safety skills	4.49	0.57
Electrical safety skills	4.29	0.63
Toy safety skills	4.31	0.58
Communicable disease safety skills	4.43	0.53
Sexual abuse safety skills	4.19	0.55

Feedback from the heads of 13 CDCs and participating caregivers was used to refine the curriculum, ensuring broader coverage of safety-related competencies. The revised curriculum was then expanded to two additional centers: Sam Kwai Phueak Subdistrict Child Development Center and Wat Klang Bang Kaeo Preschool Training Center. In these centers, caregivers' knowledge and understanding of learning experience organization showed significant improvement after training (Table 6). The average pre-training score was 9.78 (SD = 0.83) out of 20, increasing to 14.89 (SD = 0.78) post-training, a statistically significant difference at the .01 level (t = 21.94, p < .01). Moreover, both the ability to organize learning experiences and the quality of learning experience plans were rated at the highest level, confirming the curriculum's adaptability and effectiveness in different settings.

Table 6: Comparison of caregivers' knowledge and understanding before and after training in two expanded centers

Knowledge score	n	Full score	M	SD	*t*	Sig
Pre-training	9	20	9.78	0.83	21.938**	.000
Post-training	9	20	14.89	0.78		

Note: **p < .01

3.5 Effectiveness of the competency training course

The overall effectiveness of the competency training course was assessed against four criteria (Table 7). Results confirmed that the training met all criteria:

1. Knowledge and understanding of learning experience organization significantly improved after training.
2. Caregivers' ability to organize learning experiences was consistently at high to very high levels.
3. Caregivers' learning experience plans were also rated at high to very high levels.
4. Children's safety skills were maintained at a high level across all areas.

These findings indicate that the curriculum is effective in enhancing both caregiver competencies and child outcomes in safety-related learning.

Table 7: Effectiveness of the competency training course

Item No.	Effectiveness criteria	Analysis results	Summary
1	Caregivers' knowledge and understanding of organizing learning experiences improved significantly (p < .01)	Confirmed	In accordance
2	Caregivers' ability to organize learning experiences reached high to very high levels	Confirmed	In accordance
3	Caregivers' learning experience plans reached high to very high levels	Confirmed	In accordance
4	Children's safety skills reached high levels across domains	Confirmed	In accordance

3.6 Connoisseurs' training course opinions

A connoisseurship seminar was conducted with five experts to validate the training course. Their evaluations showed unanimous agreement that the curriculum was beneficial across all five assessed areas: teacher professional development, learner quality development, integrated learning innovation, institutional quality development, and overall educational quality development.

Experts emphasized that the course aligns with current developmental needs, equips caregivers with practical strategies for organizing learning experiences, and supports the creation of tools for assessing children's safety skills. The training course was thus considered a valuable model for strengthening early childhood education quality in Thailand.

4. DISCUSSION

This study developed and validated a competency-based training curriculum for early childhood caregivers to improve child safety skills. The training curriculum was designed with five-day structured training materials and activities focusing on case study analysis, collaborative problem-solving, and practical skill development. The R&D cycle (R1–D1–R2–D2) was followed. The curriculum was validated through baseline data, an expert review, and repeated testing.

The results indicated the success of the training. Caregivers' knowledge and understanding of learning experience management were significantly higher after the training. This result signified the importance of integrating theoretical knowledge with practical experience, consistent with an area-based teacher development approach (Narintarangkul Na Ayutthaya, 2018). Providing caregivers with systematically organized knowledge and training materials, and granting them opportunities to practice applying knowledge in real situations, contributed directly to the result.

The organization of learning experiences for care recipients by caregivers increased. This resulted from the collaborative training process, supported by experts and supervisors providing feedback to encourage learners to use their skills. Emphasizing the application and integration of professional learning community processes (Arroyo et al., 2023; Childress et al., 2023), such as peer support and observation (Joo et al., 2022), coaching, and exchanging experiences to solve problems collaboratively, led to sustained changes and development. Moreover, the participation of local administrators provided additional suggestions and support. The resources necessary for use and the creation of an atmosphere and opportunities for sharing decision-making authority promoted the empowerment of caregivers in applying their knowledge and effectively using their skills.

Assessment results of caregivers' learning experience plans indicated high quality. Researchers' and administrators' guidance and feedback were reported to help strengthen planning and documentation, which is consistent with the conclusion that empowerment contributed to teachers' higher capacity and greater commitment to their organization.

Most significantly, children's safety skills were consistently high in the six aspects of safety assessment: road safety, drowning prevention, electrical safety (including burns) (Price et al., 2021), toy safety, communicable disease prevention, and protection against sexual abuse. These results indicated that the training curriculum could translate caregivers' learning into meaningful outcomes for children. The use of role-play, simulation, and storytelling, together with safety-related projects, ensured that safety content was delivered in developmentally appropriate ways, as documented in previous studies (Juntawong et al., 2021; Kawee et al., 2024; Yang et al., 2007). Finally, the key strategies for preventing unintentional childhood injuries are a combination of behavior and environment modifications, which are accomplished through engineering, education, and enforcement (Jullien, 2021). Furthermore, the success of the curriculum underscores the importance of a systematic, competency-based approach that integrates knowledge acquisition with practical application and continuous feedback (Benayoune, 2024). This aligns with contemporary models of adult learning and professional development in early childhood settings. A limitation of this study is its primary focus on caregivers within a specific provincial context (Nakhon Pathom). Therefore, future research should test the curriculum's adaptability and effectiveness in other provinces of Thailand and with more diverse caregiver populations. The positive outcomes observed in children's safety skills highlight the curriculum's potential as a scalable model for enhancing safety education nationwide (Bright et al., 2022). For practical implementation, it is recommended that local administrative organizations integrate children's safety skills training into their standard professional development programs and provide ongoing support through professional learning communities to sustain the competencies gained (Lenning et al., 2023).

5. CONCLUSION

The competency-based training curriculum developed in this study consists of eight major components (curriculum problems and importance, principles, objectives, contents, training activities, period, training materials, and evaluation) with a five-stage structured training model.

The curriculum was effective in all evaluation areas:

- Caregivers' knowledge and understanding improved significantly ($p < .01$).
- Caregivers' ability to organize learning experiences reached high levels.
- Learning experience plans were rated highly effective.
- Children's safety skills across six domains were at high levels.

The curriculum was validated by experts as useful for teacher professional development, student learning outcomes, innovative practices, and institutional quality improvement.

It is also suggested that caregivers should possess formal training in early childhood education and related practical experience in order to maximize curricular benefits. It is recommended that a survey of local contexts and needs be conducted before implementation begins, as CDCs may vary in their resources and face context-specific challenges. The training should focus on collaborative, practice-based learning for caregivers and be supported by feedback, coaching, and extended professional learning community activities. Administrators should also create supportive conditions by providing necessary resources, encouragement, and opportunities for caregivers to apply their learning in practice.

DECLARATION

1. Conflict of interest
The authors declare no conflict of interest.

2. Generative AI and AI-assisted technologies in the writing process
The authors utilized Scholar GPT and Grammarly to refine the academic language and enhance the clarity of this manuscript. These tools were employed specifically for editing and improving the grammatical structure of the pre-written text. The authors take full responsibility for the content, interpretation, and conclusions of this work.

3. Data availability statement
The authors confirm that the data supporting the findings of this study are available within the article.

4. Ethics statement
This study was approved by the Ethics Sub-Committee for Research Involving Human Subjects, Nakhon Pathom Rajabhat University. (Reference Number: COA No. 012/2024). The approval was granted on May 27, 2024. Informed consent was obtained from all participants involved in the study.

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6. Contributor Role Taxonomy (CRediT)
Chamrus Intalapaporn: Conceptualization, Methodology, Writing-original draft, Funding acquisition, Data curation, Validation, Investigation, Formal analysis, Writing-review & editing, Visualization.

Rattanawan Limwattanasamoot: Conceptualization, Methodology, Writing-original draft, Funding acquisition.

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