ACCESSING TEACHERS' AWARENESS THROUGH THE TRAINING COURSE "INSTRUCTIONS FOR ORGANIZING STEAM EDUCATION ACTIVITIES FOR PRESCHOOLERS": CASE STUDY IN THAN UYEN DISTRICT, LAI CHAU PROVINCE

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Abstract. STEAM Education (Science, Technology, Engineering, Arts, and Mathematics) is an integrated approach to Preschool education that helps children discover, experience, and learn through engaging in practical, creative, and stimulating activities. In order to organize STEAM education activities for preschoolers, one of the leading strategic factors is the awareness of preschool teachers. In this study, we present the results of the analysis of awareness and skills of 127 preschool teachers through the use of online surveys and observation, attending 02 STEAM educational activities held directly on children in Than Uyen before and after the training course "Guidance in organizing STEAM educational activities for preschooler", sponsored by CWS. The results show that through awareness training, the confidence of preschool teachers in organizing STEAM education activities for children has increased.

Keywords: teacher awareness, training, STEAM education activities, Than Uyen district, Lai Chau province, preschool.

1. Introduction

STEAM education is mentioned as a new wind, a "breakthrough in pedagogical innovation" [1], which plays a very important role in developing skills and thinking for preschoolers. Preschool education is the first level of education in the national education system, creating the basis and foundation for the formation of human personality. What children acquire from childhood will significantly affect each individual's later intellectual and personality development. In the care and education of children in general and STEAM education for preschoolers in particular, teachers play a vital role in determining the quality, effectiveness, and success of the care and education of children [2], [3], [4].

In the study of Trundle and colleagues (2016), the role of preschool teachers was recognized as the promoter of the development of STEM/ STEAM skills and the imparting of STEM knowledge to children from an early age. They have also emphasized that teachers need to be trained to be able to organize STEM activities that are appropriate for children, including how to design learning activities that are appropriate for preschooler's age, how to understandably explain scientific and technical concepts, and how to motivate children to learn in groups [5].

In addition, according to research by Lee et al. (2021), preschool teachers play an important role in stimulating children's curiosity and creativity through STEM activities. The study also

emphasizes that teachers need to be trained in appropriation with STEM teaching methods for children to achieve the desired outcome [6].

Additionally, research indicates that the proficiency and self-assurance of preschool educators in STEAM education have a substantial influence on the excellence of STEAM teaching [7], [8], [9], [10], [11]. These studies highlight the important role of preschool teachers in organizing STEAM activities and supporting the development of STEAM skills for children. To be most effective, teachers need to be trained and have specialized knowledge in the STEAM fields, as well as be able to apply teaching methods suitable for children.

To meet those requirements, educational authorities need to focus on training and skills building for preschool teachers in the field of STEAM. In recent years in Vietnam, there have been several training courses on STEAM education for preschoolers through online and offline formats. However, "the training courses often stop at getting acquainted with STEAM education" [12], lacking in-depth observation on preschool teachers' organization of STEAM education activities.

This study aims to present the analysis results of the preschool teachers' awareness and skills in organizing STEAM education activities for preschoolers. The analysis is based on an online survey, and 02 auditions for STEAM education activities for children held in Than Uyen District before and after the training course "Guidance in organizing STEAM education activities for preschoolers", sponsored by CWS. This study aims to evaluate the refresher program of the course "Guidance in organizing STEAM education activities for preschooler" in Than Uyen, then to find the direction to adjust and improve the refresher program to suit four key questions:

(1) The difficulties of teachers when organizing STEAM education activities for preschoolers

(2) After the training, are the teachers more confident in organizing and designing STEAM teaching activities?

(3) How do preschool teachers feel after the training?

(4) What is the desire of the preschool teacher after the training course?

2. Content

2.1. Research methodology

- Research Methods: This survey utilizes both qualitative and quantitative research methods during the data collection process. Specific research methods include:

+ Questionnaire: A survey form is designed with a set of questions to explore the awareness and skills of teachers who attended the "Guidance for Organizing STEAM Education Activities for Preschool Children" training course.

+ Interviews: In-depth interviews based on pre-designed question systems or analysis of lesson plans for activity organization.

+ Observation: Direct classroom observations of two lessons at MT Preschool (Designing a Car from a Box using the EDP process by Teacher VLT and the "Sinking Egg - Floating Egg using the 5E process by Teacher HTT) to gather additional information about the skills and methods of organizing STEAM education activities for preschool children.

+ Data Analysis Method: Information from the questionnaire is statistically processed using SPSS 26.0 software. Qualitative data from in-depth interviews and lesson plan analysis are recorded, synthesized, and analyzed alongside quantitative data according to the survey objectives.

- Sample, Location, and Survey Period:

The survey was conducted on 127 preschool teachers in Than Uyen, both before and after the training process, and all the data collected was carefully filtered for subsequent numerical analysis. Additionally, 15 in-depth interviews were conducted to further elucidate the choices made by the preschool teachers before and after the training, in conjunction with observing two teaching sessions at MT Kindergarten.

2.2. Research results

2.2.1. Process and content of the training course

Training Procedures

The training process consists of 3 stages: (1) Preparation; (2) Implementation; (3) Summary. This process is shown in detail as follows:
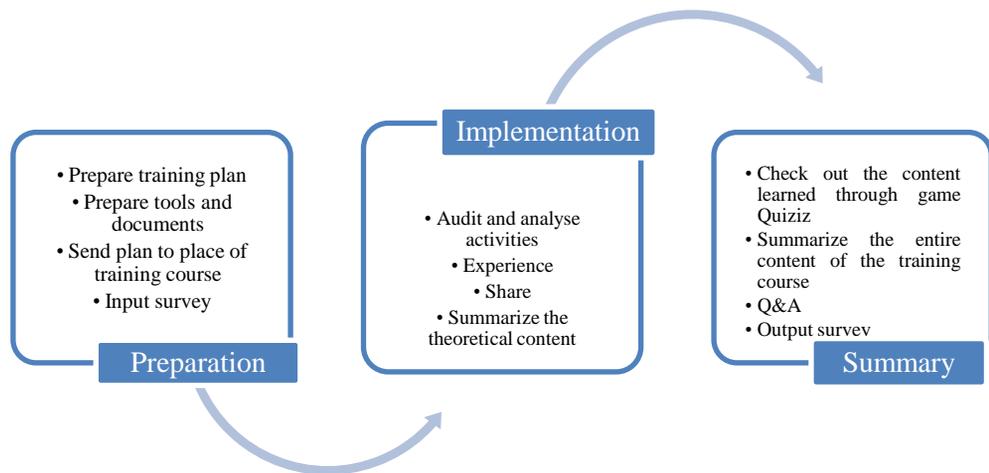

Figure 1. Training process for preschool teachers on STEAM education.
CONTENTS OF THE TRAINING COURSE
Table 1. Training course content

No.	Contents	Detailed contents
1	Overview of STEAM Education in Preschool Education	STEAM education and the role of STEAM education for preschooler
		Access to S, T, E, A, and M elements in the preschool education program
		The similarities and differences between STEAM Education and Traditional Education
		Characteristics of STEAM education activities for preschoolers
		STEAM education development strategy in preschools
2	Skills to search for references and choose the process of organizing STEAM educational activities	How to find references for STEAM education for preschoolers
		The process of designing STEAM educational activities for preschoolers (building content networks, operating networks for the STEAM project)

3	Skills to plan and organize STEAM educational activities for preschoolers	How to prepare a lesson plan for STEAM educational activities
		How to build problematic situations to start STEAM lessons for preschoolers
		How to use 5E, EDP, 6E, open sentence (query) process in organizing STEAM activities for preschoolers
4	Notices when organizing STEAM educational activities	Study Facilities
		Lesson
		Teacher
		Preschoolers

2.2.2. Awareness of preschool teachers before and after training Upon summarizing the surveys conducted before and after the training course, we observed positive changes among preschool teachers, specifically as follows:

The results from both the pre-training survey and the post-training survey (consisting of 127 responses obtained four days before the training and 127 feedback responses collected two days after the training) yielded the following insights:

1. Years of Experience: The experience levels of preschool teachers span a broad spectrum, ranging from 2 years to over 15 years. Notably, 82% of teachers had between 5 to 15 years of experience in teaching kindergarten classes (ages 3-6). A smaller percentage, comprising 0.28%, taught combined classes, which poses additional challenges for implementing STEAM education due to the need for heightened flexibility in activity organization.

2. Training Participation: Following the training, the post-training survey revealed that 106 teachers (79.1%) participated online, 19 teachers (14.2%) attended all three days of face-to-face training, and 9 teachers (6.7%) engaged in a combination of online and face-to-face training. Interestingly, teachers expressed a desire for the second course to offer more opportunities for face-to-face interaction with lecturers, highlighting the importance of this mode of engagement.
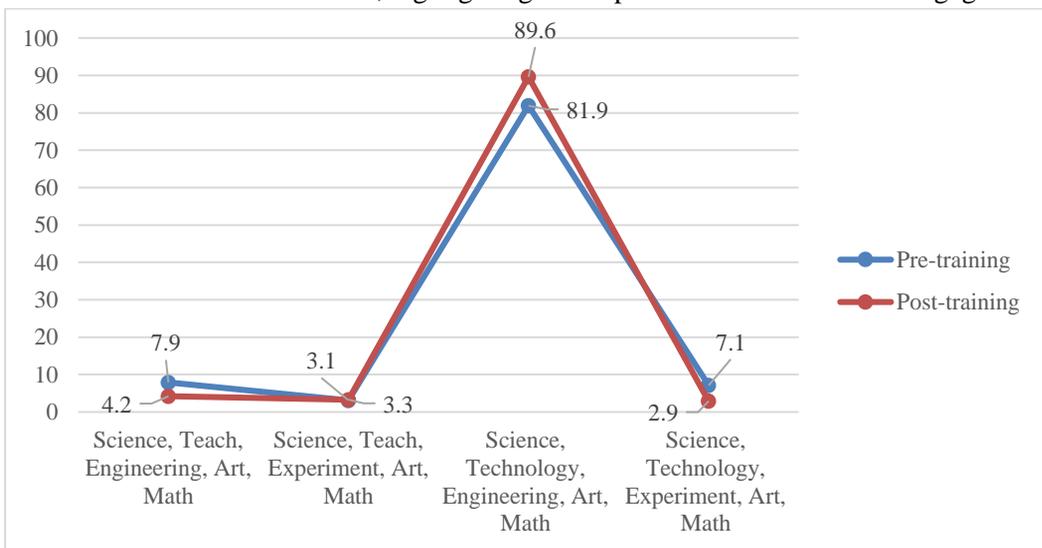

Figure 2. Teacher awareness of STEAM educational acronyms before and after training

Before training, teachers correctly understanding the term STEAM (Science, Technology, Engineering, Arts, Mathematics) accounted for 81.9%; After training, this number increased to 89.6%.

***Table 2. The summary table of challenges faced by preschool teachers before
and after the training***

Difficult	Pre-training			Mean (X)	Post-training			Mean (Y)	Y-X	*t*-test (p)
	Level				Level					
	Very difficult	Normal	Not difficult		Very difficult	Normal	Not difficult			
Lack of knowledge	29.13	41.73	29.13	2.00	13.39	41.73	44.88	2.31	0.31	0.001
Physical facilities	34.65	32.28	33.07	1.98	11.81	48.03	40.16	2.28	0.30	0.002
Lack of enthusiasm	36.22	31.50	32.28	1.96	13.39	46.46	40.16	2.27	0.31	0.002
Reference materials	41.73	29.13	29.13	1.87	15.57	45.67	38.58	2.23	0.36	0.000
Lack of interest from children	30.71	34.65	34.65	2.04	11.81	46.46	41.73	2.30	0.26	0.006

Based on the results in the data table, for each challenge, the difference in average outcomes after training and before training (Y - X) is greater than 0, with $p < 0.05$. Therefore, it can be affirmed that the results achieved in these challenges after the training have a higher impact compared to before the training. This is because, during the training, these challenges were effectively addressed. Teachers gained access to additional sources of information to reference when organizing STEAM educational activities for preschool children. They also learned how to make efficient use of recycled materials from nature and the local environment in their classrooms instead of preparing expensive materials for their activities.

After the teacher training session, some difficulties were presented, such as organizing lessons in combined classrooms, slow awareness among children from ethnic minorities, language barriers between the teacher and the children, limited self-confidence and willingness to share among the children, and addressing challenging situations. The majority of the children belong to the H'Mong ethnic group, with limited proficiency in the Vietnamese language, common sense awareness, and a lack of parental involvement in their education.
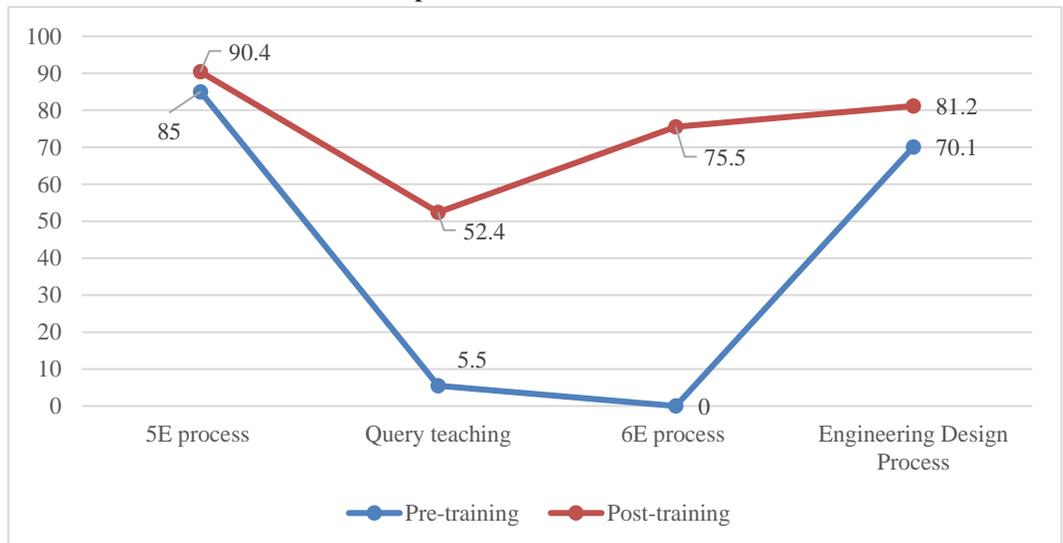

***Figure 3. Awareness of teachers about the appropriate process
in organizing STEAM education activities before and after the training***

The data showed that after participating in training on the use of organizational processes in STEAM education, preschool teachers had a significant improvement in their awareness and knowledge. The percentage of teachers who understood and used the processes increased significantly, especially for the 6E process (0,0% to 75,5%) and query teaching (5,5% to 52,4%). These results showed the positive impact of training and the need for continued support and training so that teachers could apply these processes effectively and regularly in teaching. This study provided useful information to improve STEAM education in preschool.

After training, the percentage of teachers having confidence in organizing STEAM educational activities increased from 38.6% to 51.1%, and the percentage of teachers lacking confidence decreased to 10.4% as follows:
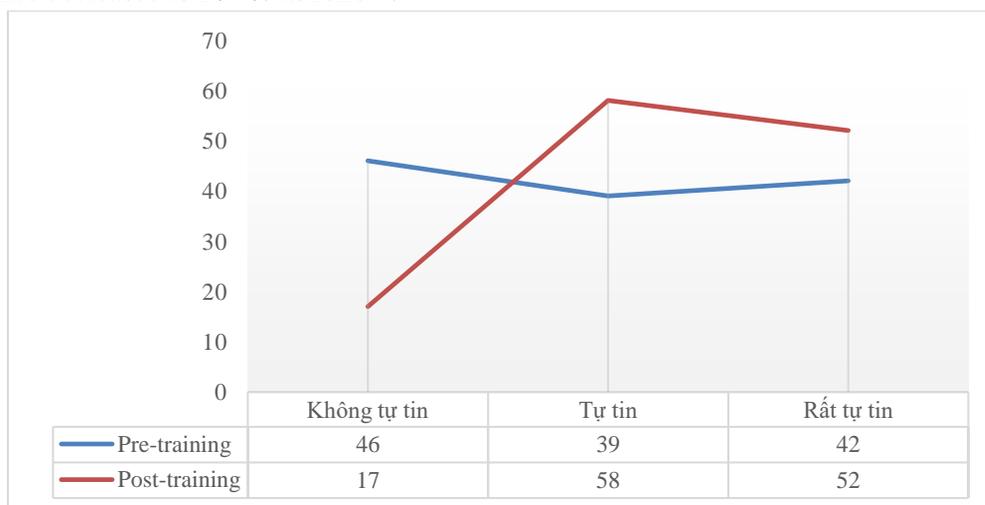

	Không tự tin	Tự tin	Rất tự tin
Pre-training	46	39	42
Post-training	17	58	52

Figure 4. Confidence of teachers when organizing STEAM educational activities post and pre-training

Table 3. The statistical parameters of teacher confidence before and after participating in STEAM education activities for preschool children

	Statistical parameters			
	Mean	**Std. Deviation**	**Average effect (Pre-training – Post-training)**	**t-test**
Pre-training	1.97	0.84	0.31	0.002
Post-training	2.28	0.69		

From the results of the statistical parameters measuring the confidence of preschool teachers before and after training, the mean difference in the achieved results (After training – Before training) > 0, with a p-value < 0.05, indicating that the difference in average scores is statistically significant. This demonstrates that the training has helped preschool teachers feel more confident in organizing STEAM education activities for children. Additionally, the number of teachers who were unsure about conducting STEAM education activities for children has significantly decreased. All of these findings suggest that the STEAM training has yielded positive results in the perception of preschool teachers.

Regarding the teacher's feedback on the training course, most teachers were very satisfied and felt useful. Ms. L.T.L, a teacher at Cac Na 1 – Ta Hua Preschool shared, "I learned a lot, gained more knowledge about STEAM, and more interest in STEAM". Ms. B.T.H, a teacher at Muong Cang Preschool, said, "After the training, I was very satisfied with the lecturer's teaching methods which helped me master the process of 5E, EDP, and 6E. I learned many ways to create situations in the lesson and learned more about the sources of materials". On the other hand, there

are some comments from teachers in online courses who did not hear well due to the noise, such as "poor transmission, difficult to hear", and "looking forward to participating in face-to-face training."

Overall Assessment

1) After the training, teachers have a correct understanding of STEAM education, characteristics, elements in STEAM education, 5E, 6E-EDP lesson process in STEAM education, teaching process, supplies, learning materials, and how to choose STEAM lessons integrated with the preschool education program.

2) Teachers are confident in the implementation of STEAM teaching because of having been equipped with some solving-difficulty skills and initially realizing the superiority of STEAM education compared to other educational approaches. Meanwhile, before the training, teachers had not pointed out the superiority of active teaching methods clearly.

3) Students study diligently, are serious and enthusiastic in auditions and discussions, take full notes about lessons, and change positively from the first day to the second day of training. Some students are very enthusiastic to participate in discussions, express their opinions, are ambitious and eager to learn and demonstrate strong professional competence and creative capacity in teaching.

2.2.3. Observe, audit, and comment on 02 STEAM educational activities of teachers

Advantages: Teaching lessons were natural without teaching in advance or choosing young students; Teachers were confident, poised, and interacted with children very well; Teachers prepared lessons and teaching facilities thoughtfully, with a main focus on natural learning materials; Teachers were quite flexible in lesson activities; There was smooth coordination between 2 teachers in the lesson

Disadvantages: The lesson objectives had not been clearly defined, the way to identify the elements S, T, E, A, and M was still ambiguous; The lesson content had not been closely linked to the set goals; Asking questions had not stimulated the preschoolers' thinking or exploited the preschoolers' language; The connection between the contents and the activities was not logical and unconnected; The way teachers grasping situations, stimulating creativity, curiosity, and imagination of the preschoolers had not flexible enough; Teachers intervened often in the process of children's activities

The direction of adjustment through 02 activities: It is necessary to master the elements S, T, E, A, M, specific and processes of 5E, EDP, and 6E in STEAM education activities; Set a goal that sticks to the preschoolers' level of perception and uses measurable verbs to help children be able in presenting, listing, and describing; The form of organizing activities should be diverse and flexible, aiming to increase children's opportunities to share in activities; How to ask appropriate questions to the preschoolers' age and exploit the preschoolers' experience, such as "What do you think about that? What do you think you should do next?"; Situations that take place in class should be flexibly handled; Teachers need testing before organizing activities to anticipate possible situations; Content and methods of teaching need to stick to the lesson objectives.

Figure 5. EDP lesson "Car design from the box"

Photos of "Floating eggs – submerged eggs"

+ Remove language barriers: Ask questions suitable to the preschoolers' cognitive level and continue to practice language for children in other complementary activities such as outdoor activities, and afternoon activities. There is no effective language training path for children more than practice regularly.

+ How to ask questions in STEAM lessons: The teacher has changed the way lessons, from the teacher asking - students to listen, to the teacher asking open-ended questions, which stimulates the preschoolers' ability to think, experience directly, and share their experiences about the problem. The first period of implementation would be more or less difficult. Therefore, teachers need to be trained regularly to change thinking, awareness, and self-practicing.

+ How to choose a lesson name to integrate into the preschool education program: It should be suitable for the local context, suitable for the topic being implemented, suitable for the level of preschoolers' awareness, and suitable for teachers in preparing materials least expensively.

3. Conclusion

Training courses on "STEAM education for preschoolers" are important factors in ensuring the quality of education and skills development for preschoolers. Through the training, the observations are as of below:

Preschool teachers have been updated with the latest knowledge in STEAM education, grasped the latest trends, and the most advanced methods and techniques of teaching; and better understand the STEAM process and activities, as well as how to apply them in teaching to preschoolers. As a result, teachers could improve their teaching ability and help preschoolers develop important skills such as logical thinking, problem-solving, creativity, and lifelong learning. In addition, preschool teachers could grasp basic skills such as data analysis, design and modeling skills, and the application of scientific and mathematical methods in teaching. Thus, teachers could create more practical and interesting activities for children.

Creating a positive learning environment: Preschool teachers could master STEAM skills and apply them to teaching, creating a positive and enjoyable learning environment for children. By carrying out interesting activities and projects, teachers could spark children's curiosity and creativity, and help children develop more comprehensively.

Enhancing teaching effectiveness, the training courses on "STEAM Education for Preschool Children" have helped preschool teachers improve their teaching effectiveness. Thanks to being trained in how to design and organize STEM activities suitable for preschoolers, teachers could equip themselves with the necessary skills and knowledge to teach STEM to children more effectively. This also means that teachers will be able to promote comprehensive development in children and help them learn and explore the world around them positively and excitingly.

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