

Classroom language training for non-English pre-service teachers: a professional development project

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ABSTRACT

As the English language is required to be used beyond English subject classrooms in English as a foreign language (EFL) country, teachers from various disciplines, such as math and science, may find it challenging when having to conduct the course in English. Therefore, this professional development project aimed to address the issue of math and science pre-service teachers lacking classroom language knowledge when teaching in an EFL setting. The project involved a month-long training program for pre-service teachers on how to use English classroom language in teaching Math and Science to elementary and high school students. Pre- and post-training video recordings were collected to evaluate the linguistic development of the participants in classroom language use. Additionally, journal entries were collected to know the participants' insights on pedagogical growth and perceptions when using English in teaching content lessons. The findings indicated a significant improvement in the participants' classroom language use in various areas such as greetings and lesson introductions, feedback and instructions, classroom management, requests and questions, and lesson conclusions. The pre-service teachers also reflected on their pedagogical development in their journals. The article discusses some implications of the project that could benefit similar initiatives in EFL settings that use English as partial or full medium of instruction.

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1. INTRODUCTION

Science and technology have undoubtedly revolutionized the way people interact with each other around the globe. As science and technology advances, there is a need for the young generation worldwide to have literacy in science and technology [1]–[3]. Schools and institutions have to adjust their teaching approaches towards such fast change. As a result, educational institutions worldwide have adopted the science, technology, engineering, and mathematics (STEM) curriculum which focuses on developing knowledge and skills in math and science [4]–[6]. As Millar [7] put it, STEM is now being translated as, “a curriculum organizer that has the possibility of engaging and retaining students and is interdisciplinary and skills focused”. As there is a growing demand for STEM education in schools, so as the literacy of teachers in the STEM field. This leads to the need for educational institutions, especially in the teacher training programs, to prepare teachers to become highly literate in teaching STEM [8]–[11]. However, to compete in the global arena, English language then becomes another barrier for non-native speakers [12]. In Thailand, for instance,

English is labeled as a foreign language. Although math and science pre-service teachers have the ability to effectively implement the STEM lesson in class, many teacher training programs offered at a university still utilize the Thai language as the primary medium for instruction and practical training. This is not surprising as communication in a native language could provide a faster communication and comprehension process between Thai teachers and students. Concerning English language usage and STEM education, most previous research studies appear to focus on preparing technological pedagogical knowledge [13] of pre-service teachers and in-service teachers [14] without considering the need for language-related skills for non-native English teachers when having to teach in an international or English settings. Recent research study by Le *et al.* [15] reported that many teachers found themselves having limited knowledge and lack of innovative methods in teaching STEM and recommended that more training is needed to develop necessary skills.

Thailand's educational reform emphasizes on the importance of 21st century skills and STEM education [16]. Previous studies conducted in Thailand on STEM education for pre-service teachers appear to use Thai as a medium of instruction. This becomes a challenge for teachers when English is required to be used as a language of instruction when they have to teach in the English program (EP) or an international program curriculum. As a result, there is a need for pre-service teachers to prepare themselves with classroom language knowledge to teach in the English as a foreign language (EFL) classroom setting to compete in the global community as well help Thai students improve their English language proficiency. Although previous studies have provided insightful suggestions in conducting classes in English [15], [16], another emerging field of investigation is in the actual practice of communicative English usage in class for pre-service teachers. For instance, one of the most concerning skills that pre-service teachers in Thailand appear to lack is that of speaking skill. Phaisannan *et al.* [17] conducted a study to promote English pre-service teachers' speaking ability through the use of task-based learning and the common European framework of reference (CEFR) with peer-interview techniques. The verbal and non-verbal communication skills of pre-service teachers improved as a result of the program. As of now, English language competence is clearly needed for those interested in becoming an instructor or a teacher in schools. There have been many attempts to define 'competence' reflected through various instructional means [18]. However, the actual use of its definition and how practitioners turn language competence into practice in the classroom is very scarce. One way to enhance language competence, specifically classroom language in this case, would be to train pre-service teachers in the training or developing courses.

As there is an increasing demand for the use of English as a language of instruction [18]–[22], teachers are expected to be acquainted with both the content of the subject and the pedagogical use of the English language. This can be challenging for subject teachers, especially those who teach subjects that are not related to the English language. Such encounter is not surprising as linguistics is one of the major categories found and categorized by Bradford [23] to be challenging for teachers in English medium instruction (EMI) classrooms. This leads to concerns over the effectiveness and readiness of teachers' training programs and teachers' ability to use English in class. Doiz and Lasagabaster [24] pointed out that "although many higher education institutions worldwide have rushed to the jump on the EMI bandwagon, a strikingly low percentage of them have deemed it necessary to organize pre-service or in-service courses to help practitioners tackle this new teaching scenario" (p. 48). In line with Doiz and Lasagabaster's [24] claim, Deignan and Morton [25] also mentioned that teachers feel insecure in their own linguistic performance in EMI classroom. As a result, an increasing number of experts in the field of English for specific purposes (ESP) are calling for more research to be conducted on teacher training for EMI [25]. Although there has been research conducted on EMI and teacher training in recent years, many teacher training programs are still in its development stage and that more empirical data have yet to be validated [26]. For instance, published materials for English-medium-instruction lecturers' training courses are scarce, and the previous literature on hand-on experience by teachers in English medium of instruction, especially in STEM context, is still very limited [23].

2. METHOD

2.1. Participants in the study

The study was conducted at a prestigious university known for its excellence in science and technology education. The university offers a graduate program for teaching science, which is taught in Thai. However, the program encourages pre-service teachers to enhance their English language ability during their teaching practicum. As part of the program's curriculum, students are required to gain practical experience by teaching in field schools.

The study had seven participants, all of whom were enrolled in the graduate program for teaching science and mathematics at the university. As this research project focuses on specific group of participants, the adequacy of seven-participant sample size was determined by the guideline of research design sample size of [27]–[29] in the type of case study research design which suggest the minimum number of three to

five participants. Although the minimum sample size suggested by Cresswell [27] for a case study is that of three to five participants, this study added two more as the study involves different subject areas of STEM (science and math). With small number of participants, an in-depth analysis of each participant's experience can provide a comprehensive understanding of their unique journeys throughout the training. Such detailed approach to small sample size ensures a thorough examination of participants' experiences. Their nicknames were Non, Nut, Su and Pree which were enrolled in the science program. The other three, Tha, Waw, and Nee are in the mathematics program. These participants were willing to take part in the current study, which aimed to explore the effectiveness of the professional development program in enhancing their language abilities, specifically on classroom language.

2.2. Instruments, data collection and data analysis

The 2-hour weekly classroom language course is specifically designed for non-English pre-service teachers who aim to integrate the use of English language in content subjects like mathematics and science. This course hopes to raise awareness among the participants about the importance of using English as a means of instruction in the classroom. Throughout the course, the non-English pre-service teachers were taught by a language specialist and were exposed to different English language expressions commonly used in the classroom. By the end of the course, students are expected to incorporate those expressions in their teaching practice and future teaching career. The course was divided into five sessions. In session 1, the course objectives were discussed and the students were encouraged to share their teaching experiences. They were also asked to video-record their first teaching demonstration. Session 2 covered the classroom language used for greetings, introductions, giving feedback, ending a lesson, and other important expressions. At the end of the session, a teaching demonstration and written reflections were required. In session 3, the language used for classroom management and giving instructions were discussed. Similar to session 2, this session included a teaching demonstration and written reflections. In session 4, students were taught the language for making requests and asking questions. Like the previous sessions, both teaching demonstration and written reflections were required. The last session concluded the course with a final video-recorded teaching demonstration and oral reflections. By the end of the course, pre-service teachers would have gained valuable knowledge in using specific English language expressions in the classroom.

2.3. Video-recorded teaching demonstrations

As part of the 10-hour classroom language course, pre-service teachers were instructed to conduct teaching demonstrations using the taught classroom language expressions. These demonstrations were video-recorded on the first and final weeks of the course, with a minimum teaching time of 10 minutes for science or mathematics subjects. Comparing the first and final week's teaching demonstrations is to serve as empirical evidence to see if there is a significant improvement in the pre-service teachers' ability to integrate English classroom language into their teaching. The recordings also provide valuable insights into how students use language expressions and their ability to communicate effectively with their students. Moreover, the inclusion of video-recorded teaching demonstrations is a valuable way to raise awareness among pre-service teachers of integrating the use of English classroom language in content subjects such as mathematics and science.

To address the first research question, the video-recorded teaching demonstrations were transcribed and analyzed using content analysis. To ensure the reliability of the analysis, inter-rater coding was conducted by two independent researchers. The transcribed data were then examined to identify the frequencies of classroom language expressions used. The collection of teaching journals served as a tool to gain insights from the pre-service teachers regarding their experiences and perceptions towards the professional development course. It was gathered using a Google Form during sessions 2, 3, and 4. The pre-service teachers were given a prompt to consider specific issues during their teaching demonstrations, such as the challenges they faced while learning and teaching the classroom language expressions. The journals were analyzed thematically to address research question 2, which aimed to investigate the challenges faced during the professional development course on classroom language. Inter-rater coding was used to ensure coding reliability.

3. RESULTS AND DISCUSSION

3.1. Extent of classroom language knowledge after the professional development course

The extent of classroom language knowledge gained by the pre-service teachers after the professional development course is shown in Table 1. Frequency of classroom language used in pre- and post-teaching were categorized into: i) Greetings and lesson introduction; ii) Giving feedback and instruction; iii) Classroom management; iv) Making requests and questions; and v) Ending lessons. Participants' data and insights are described in Table 1.

Table 1. Frequency of classroom language used in pre- and post-teaching

	Greetings and lesson introduction		Giving feedback and instruction		Classroom management		Making requests and questions		Ending lessons	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Non	3	8	0	11	2	32	1	39	0	0
Nut	4	5	0	3	2	10	4	21	1	5
Su	5	6	3	12	7	28	4	13	1	3
Pree	4	8	2	8	8	30	1	14	2	5
Tha	4	4	1	3	2	14	1	5	1	3
Waw	2	4	0	9	0	12	1	15	1	5
Nee	4	8	3	12	0	10	7	15	1	3

3.1.1. Non's data and insights

Based on the data provided, Non's knowledge on classroom language significantly improved in all categories after taking the professional development course. Before the course, he had a score of 3 in greetings and lesson introduction category, but after the course, the score increased to 8. In giving feedback and instructions, Non had no prior knowledge before the course but was able to score 11 after the course. In classroom management, the pre-teaching score was 2 and significantly improved to 32 after the course. For Making requests and asking questions, he scored 1 before the course, but improved to 39 after the course. Lastly, Non's had no prior knowledge in ending lessons, and the post-teaching score remained at 0.

Non was aware that he tended to use the same sentences and praise repeatedly, and he also had a tendency to use filler words such as "okay" multiple times. However, he also acknowledged that he had gained more confidence in speaking English, which he attributed to the course and the environment in the classroom. Non also realized that he needed to use more WH-questions in his teaching. Overall, he believed that there is still room for improvement in his classroom language skills.

3.1.2. Nut's data and insights

It can be interpreted that Nut had some level of knowledge on classroom language in all the five categories before taking the professional development course. However, after the course, Nut showed improvement in all the categories. Nut's knowledge on giving feedback and instructions showed the most significant improvement, increasing from 0 to 3. Nut also showed considerable improvement in making requests and asking questions, with the score increasing from 4 to 21. The smallest improvement was seen in the category of greetings and lesson introduction, where the score only increased by 1 point. It can be inferred that the professional development course was effective in improving Nut's knowledge of classroom language.

Nut perceived that his fluency in speaking improved in video 2 compared to video 1. He attributed this improvement to learning about how to introduce themselves, initiate discussions, provide feedback, give homework, and schedule appointments and locations for the next class. Like Non, he still believed that he can improve his classroom language skill when more professional courses are offered to them.

3.1.3. Pree's data and insights

It appears that Pree's knowledge on classroom language improved in all categories after the professional development course. In particular, Pree showed the most improvement in classroom management, where their knowledge increased from 8 in the pre-teaching phase to 30 in the post-teaching phase. Pree also showed significant improvement in giving feedback and instructions, making requests and asking questions, and greetings and lesson introduction. Overall, the professional development course seemed to have had a positive impact on Pree's knowledge and understanding of classroom language.

Pree rated her teaching performance in using classroom language a 3 out of 5. She was pleased with her progress in communicating with students and attempting to speak more, even though it may not be a lot. In the past, the Pree was too afraid to speak English and lacked confidence, but the program helped her to understand and express themselves better. Pree received support and suggestions from teachers and classmates, which helped her to feel more confident speaking in front of a class. She believed that if there were more program arrangements in the future, it would allow them to practice more and become even more confident in using classroom language.

3.1.4. Tha's data and insights

Tha's knowledge on classroom language has improved in all categories except for greetings and lesson introduction, where there was no significant change. The most notable improvement was in classroom management, with an increase from 2 in pre-teaching to 14 in post-teaching. Tha's knowledge on giving feedback and instructions, making requests and asking questions, and ending lessons also showed improvement, but to a lesser extent. Based on the results, Tha rated her classroom language in teaching

performance a 1 in video 1 and a 3 in video 2. She credited the improvement in her rating from video 1 to video 2 to her improved teaching English performance. This improvement is reflected in the increase in the number of classroom language used in pre- and post-teaching, as shown in the above table. Tha also believed that her communication in the English language had improved, and she had learned more about the different sentences used in various situations.

3.1.5. Waw's data and insights

Waw's knowledge on classroom language shows improvement in all categories after the professional development course. The most significant improvements are seen in giving feedback and instructions (from 0 to 9) and making requests and asking questions (from 1 to 15). In terms of greetings and lesson introduction, there is a slight improvement (from 2 to 4), while the improvement is moderate for ending lessons (from 1 to 5).

Waw rated her teaching performance in using classroom language a 3. She had improved from the first video clip and was using introductions and showing admiration towards students after they answer questions. However, she recognized that she still has areas for improvement, such as speaking more clearly, spending more time rehearsing, and managing their excitement during video recordings. Waw thought that she has some room to improve in her use of classroom language and is capable of continuing to improve.

3.1.6. Nee's data and insights

Based on the provided data, Nee's knowledge on classroom language has improved in most of the categories after the teaching demonstrations. In the category of greetings and lesson introduction, Nee's knowledge has improved from 3 in pre-teaching to 8 in post-teaching. In the category of giving feedback and instructions, Nee's knowledge has improved from 3 in pre-teaching to 12 in post-teaching. In the category of classroom management, Nee's knowledge has improved from 0 in pre-teaching to 10 in post-teaching. In the category of making requests and asking questions, Nee's knowledge has improved from 7 in pre-teaching to 15 in post-teaching. In the category of ending lessons, Nee's knowledge has slightly improved from 1 in pre-teaching to 3 in post-teaching.

Nee rated her classroom language in her teaching performance as 2 out of 5, indicating that there is a need for improvement. She acknowledged that although she knew English sentences for greeting, asking for permission, giving feedback, and classroom management, she tended to forget to use them in real teaching situations. Nee also recognized the need to develop both the use of English in teaching content and English for classroom management. However, she believed that she can teach easily, use vocabulary easily, and speak quite smoothly. Nee mentioned that she was motivated to develop her English language skills further to specialize in teaching in English as a medium of instruction.

3.2. Challenges faced by non-English pre-service teachers during the professional development course

Based on their reflective diaries, the pre-service teachers mentioned the following challenges: low English language proficiency and lack of confidence, difficulty in preparing content lessons in English, lack of knowledge on questioning techniques in English, and difficulty in teaching the content in English. Low English language proficiency can be cause of confidence in a classroom. This affective factor is frequently being explored to find ways to enhance and build both pre- and in-service teachers' confidence. Difficulty in preparing content lessons in English is a problem not only for teachers in EFL countries but also within English speaking countries as well [30]. Hence, a clear model or framework of the English content preparation for teachers is needed and could be one aspect that teacher training could focus on.

3.2.1. Low English language proficiency coupled with lack of confidence in teaching in English

The pre-service teachers have noted their struggles with speaking English fluently and confidently. They mentioned the need to practice using the correct vocabulary and sentences to communicate effectively with students. Moreover, they are not confident in their ability to speak English fluently, leading to difficulty in conveying ideas to the students. For instance, the teachers are concerned about using the correct vocabulary and grammar when discussing the lesson, for example on 'percentage'. They also struggled with answering students' questions because of limited vocabulary. In her teaching demonstration, Waw mentioned that she had difficulty in introducing herself and the lesson in English.

"I struggled to speak fluently and make grammatically correct sentences. I felt nervous and excited, which led to confusion and disorganization in my lesson. However, in the next demonstration, I planned to speak more slowly and clearly to help the students understand the concepts better and to communicate effectively." (Waw)

3.2.2. Difficulty in preparing content lessons in English

The pre-service teachers realize the importance of planning and preparing the lessons in English before teaching. They need to have a sequence of teaching steps to follow and ensure the flow. In the succeeding lessons, they have shown a strong focus on improving their teaching skills by addressing language proficiency, reviewing prior knowledge, and improving classroom engagement and management. They believed that these are essential for effective teaching and learning. Nee said,

“In my first demonstration, I was excited to speak English and didn't prepare well for the class due to difficulty in preparing the content in English, from translating Thai into English. Also, I did not have a clear sequence of teaching steps and forgot important information. However, in the next demonstration, I prepared a lesson plan and the sequence of teaching to improve my preparation. I also used translation tools to help me with language difficulties. Actually, at first, I was not sure how to introduce the percentage concept to the students in English, which led to confusion. I also forgot to elicit information from students about the particles in an atom, which affected my ability to teach the symbol of the element effectively. Improving my language skills and managing my preparation time is a must!”

3.2.3. Lack of knowledge on questioning techniques in English

The pre-service teachers acknowledged that they need to work on their questioning techniques to help students better understand the lesson and become more effective in assessing students' comprehension. For example, Pree said that she could have started the lesson by asking students how they are feeling or what they already know about the topic. However, she lacks the knowledge to ask the students in English. Non noted that asking easy questions and asking for volunteer students is better.

“In the first demonstration, I have asked specific students to answer the question about the color of the spectrum. However, they seemed afraid to answer and did not say anything. In the next lesson, I made sure that I asked anyone first to encourage engagement and participation. Moreover, instead of asking them to explain, I realized that asking them what they know first could start the classroom discussion. Also, I should write down questions I want to ask beforehand and practice speaking it fluently.”

3.2.4. Difficulty in teaching the lesson in English

The pre-service teachers need to focus on delivering the content of the lesson clearly and concisely. They know that they should elicit what students already know before introducing new concepts and use examples to help clarify confusing topics. For example, Nut could have shown examples of symbols for elements and explain them in detail but she was unable to do due to her English language ability. Another was not sure how to introduce the concept of percentage in English, which affected their ability to teach effectively. Also, one struggled with explaining the color of the spectrum in English to the students.

“In the first demonstration, I had difficulty explaining the periodic table and symbol of elements in English. Because I know how the periodic table works, I focused more on it than on the symbols, which caused confusion for the students. Thus, in the next lesson, described the symbol of elements in English clearly and provide examples to students.” (Nut)

3.3. Implications

The results have shown that the professional development course has improved the classroom language knowledge of the non-English pre-service teachers. Despite the success, non-English pre-service teachers still clamor for trainings or professional development courses to develop their English language skills [31]. The findings support the call for more trainings developing content pre-service teachers' English language competence in teaching [32], [33]. Perhaps, professional development courses may adopt or adopt the recent frameworks such as EMI and content and language integrated learning (CLIL) in STEM education. Collaboration between content and language teachers is encouraged. Doing so would help non-English pre-service teachers cope with challenges elicited from their journals such as lack of confidence in teaching content in English, difficulty in preparing content lessons in English, lack of knowledge on questioning techniques in English, and difficulty in teaching content in English. Not only teacher education programs should focus on learner development but also on teacher development.

The effectiveness of the program could be the result of intrinsic and extrinsic variables. For example, it may include the participants' high-level motivation as they were preparing to be deployed in the field. Also, the course was free for them and it was arranged by their program. In addition, the professional development course was hands-on – the participants were given a lecture then practice the classroom

language expressions in their in-class teaching practicum. Pre-service teachers may benefit from additional language support to improve their proficiency and confidence in the classroom. This could involve attending language classes or workshops, working with a language tutor or mentor, or engaging in language exchange programs with other teachers or native speakers. In addition, pre-service teachers should take advantage of professional development opportunities to enhance their pedagogical skills. This could involve attending workshops, conferences, or training sessions on teaching techniques, content delivery, and classroom management. Working with a peer mentor (expert teachers) who has more experience or expertise in the areas where the teacher is struggling could be beneficial. This could involve observing other teachers in the classroom, receiving feedback on their teaching, or engaging in collaborative planning and reflection sessions. They should also be encouraged to engage in regular self-reflection on their teaching practice. This could involve keeping a teaching journal, setting goals for improvement, and regularly reviewing and reflecting on their teaching practice. To build their confidence in the classroom, pre-service teachers could focus on positive self-talk, visualization, and practicing public speaking techniques. They could also seek out supportive colleagues or mentors who can provide encouragement and constructive feedback. To improve their preparation and organization skills, pre-service teachers could establish a routine for lesson planning and classroom management, use checklists and templates to streamline their work, and seek out resources and support from colleagues or professional organizations.

4. CONCLUSION

This professional development project sought to address the challenges faced by math and science pre-service teachers in EFL context, where teaching these subjects in English can be quite demanding. The project entailed a month-long training program with the aim of improving classroom language proficiency, enabling these educators to effectively teach math and science in English. The project's data collection includes a pre- and post- training video recordings and reflective journal entries which revealed a significant improvement in the participants' ability to use English classroom language effectively. Findings indicates that there were several challenges that math and Science pre-service teachers faced when conducting a class in English, especially in the preparation, skills and techniques of asking questions, and interference of content knowledge and language production to present an understandable lesson. The journal entries appear to illuminate their personal growth and development as educators. The success of this project carries important implications for similar initiatives in EFL settings. This project emphasizes the importance of equipping EFL pre-service teachers with language skills and pedagogical insights for teaching math and science effectively in English, especially in the era where English is used as an educational weapon for EFL countries to be competed at a global stage.




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