Exploring the Effects of Customized CLIL Training on Teacher Competency: Insights from Upper-Secondary Biology Teachers in Myanmar

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ABSTRACT

This study examined upper-secondary school biology teachers in Myanmar viewed the impact of a customized CLIL teacher training model on their English language knowledge, content knowledge, and teaching skills. Before the training, a needs analysis was conducted to shape the training topics, which were then integrated into this study's training framework based on Coyle et al.'s (2010) CLIL model. Data collection occurred during and after the training. Questionnaires, interviews, and micro-teaching self-evaluations were used to reflect the perceived impact of the model on teachers' competency development. Findings showed a positive impact of the model on teachers' subject content teaching knowledge, language knowledge and skills, as well as pedagogical skills though its effectiveness varied based on teaching experience. This study suggests that the teacher training model should address the unique needs of Myanmar teachers.

Background and Rationale

In response to the growing demand for language and critical skills of students in the 21st century (Wagner, 2009), Myanmar's government has implemented an education policy fostering these skills in graduates (Ministry of Education, 2012).

To achieve this, Myanmar has undertaken significant educational reforms by restructuring its school year system to a new KG+12 (5-4-3) format and updating curricula, particularly in science at the upper-secondary level, where English-language resources now replace Myanmar-language textbooks. Initiatives like the British Council's EfECT project aim to improve teachers' English proficiency to support English as the primary medium of instruction, aligning with the educational reform (Ulla, 2018b; Myint, 1992; Soe & Myint, 2020).

The education reform is clearly visible at the upper-secondary level where English has been chosen as the primary language of instruction, especially in science subjects (MOE, 2004). Scholars like Thompson and Cook (2014) highlight the critical role of upper-secondary education in preparing students for higher education and careers. Using English in education enhances academic achievement, prepares students for global opportunities, and builds global readiness (Robinson, 2017).

However, implementing English as the primary language of instruction in Myanmar's grammar-translation approach presents challenges. Firstly, like other countries where English is taught as a foreign language (EFL), the focus is often on improving reading and writing skills rather than communication proficiency (Lee, 2018). Consequently, Myanmar students have limited opportunities to interact with teachers and peers. This lack of interaction, especially in upper-secondary science classrooms, hampers student's ability to explore content through English language communication (Weil, 2013).

Another issue is that Myanmar's upper-secondary teachers often struggle with limited English proficiency and pedagogical knowledge. This hinders effective communication and impacts students' critical thinking skills (Watson, 2019). Using the Myanmar language as the medium of teaching further delays student learning and critical thinking and hinders information exchange (Soe & Myint, 2020; EfECT Handbook, 2014; Ulla, 2018a). Additionally, teachers lack essential classroom management and instructional

skills (Aung et al., 2013). While initiatives like the EfECT project aim to improve teachers' skills, they primarily focus on enhancing English proficiency (Ulla, 2018b). Ulla (2017) and Signori et al. (2024) emphasize the need for science teachers in Myanmar and Thailand to receive pedagogical training to effectively teach in English-medium classrooms.

Recognizing these challenges, Myanmar EFL educators urged for proper teacher training that can strengthen both English language proficiency and teachers' teaching (Aung et al., 2013; Weil, 2013; EfECT Handbook (2014); Ulla, 2018a). Practitioners such as Htay and Ngonkum (2023) have pointed out that it becomes essential to foster effective teacher training models in Myanmar's education system.

Content and Language Integrated Learning (CLIL) was proposed by Marsh and colleagues as a viable solution in teaching subjects like science in English, especially in European contexts. According to Marsh and Diaz (2020), CLIL training for upper-secondary teachers allowed for a dual focus on subject and language, enabling a more interactive, engaging, and creative learning environment that could meet the linguistic and academic demands of the curriculum. Empirical studies have shown that CLIL could support students' content and language learning, and improve teachers' content knowledge, language and teaching skills (Ayapova et al., 2021; Gabillon, 2013; Piacentini, 2021; Taylor, 2022). Recognized for its ability to enhance teachers' content knowledge, English language proficiency, and classroom management, CLIL is seen suitable for content teacher training in Myanmar (Htay & Ngonkum, 2023). However, CLIL is not yet widely known among teachers in Myanmar, particularly in basic education (Htay & Nyeinn, 2015; Htay & Ngonkum, 2023) though it is still quite new to the Myanmar teachers (Htay & Nyeinn, 2015). Also, limited research exists on CLIL implementation and teacher training at the secondary school level in Myanmar, highlighting the need for further investigation in this area. This study focused on biology, a compulsory discipline in a science stream and it is a hard science (Becher's taxonomy of disciplines, 1989). It aimed to explore how a customized CLIL teacher training program impacted biology teachers' competencies, specifically in English language proficiency, content knowledge, and classroom pedagogy. To reflect the teachers' competencies, CLIL idealized competencies framework proposed by Marsh and others (2011) was used as a standard measurement of competencies of a CLIL teacher (Marsh et al., 2011). Also, Coyle et al.'s (2010) CLIL model was customized. To do this, before the training in this study, a needs analysis, which was designed based on the CLIL basic and CLIL teachers' competencies mentioned by Marsh et al.'s (2011) in CLIL teacher education-EFFCTE, was done by the researchers

of this study to find learning contents of the CLIL teacher training model suitable for the target teacher trainees' learning requirements. The findings guided the selection of training contents which later on were added to Coyle et al.'s (2010) CLIL model consisting the aspects of Content, Communication, Cultures, and Cognitions. Throughout and after the training, the study assessed teachers' perspectives on their competency development.

The Research questions are:

1.What are the perspectives of upper-secondary school biology teachers on the customized CLIL teacher training model regarding their content knowledge, their English language proficiency, and their pedagogical development?

2.What are the attitudes of upper-secondary school biology teachers toward the customized CLIL teacher training model?

3.What are the comments of upper-secondary school biology teachers on the overall impact of the customized CLIL teacher training?

<center>**Literature Review**</center>

Content and Language Integrated Learning (CLIL)

CLIL is an approach integrating content and language learning (Marsh et al., 1994). The success of CLIL depends on its one of the theoretical frameworks, the 4Cs (Coyle, 2008), which bridges content and language. The framework, consisting of Cognition, Culture, Content, and Communication, is a crucial theoretical and methodological foundation for CLIL lesson planning and material development (Coyle et al., 2010). Many CLIL teaching models, such as Mehisto's model (Mehisto et al., 2008), CLIL-Pyramid (Coyle, 2008), Plurliteracies models (Dalton-Puffer, 2007), and the Language Triptych model (Coyle et al., 2010), emphasize the integration of the 4Cs to connect subject matter with language learning.

In 2007, ZydatiB updated the 4Cs framework, emphasizing language's central role in CLIL. Coyle and team (Coyle et al., 2010) further refined this by integrating ZydatiB's and their own framework, enhancing the communication element to encompass three language types, positioned at the framework's core (Coyle et al., 2010; Dalton-Puffer, 2007)

Figure 1

Modified CLIL model (Coyle et al., 2010, p. 41)
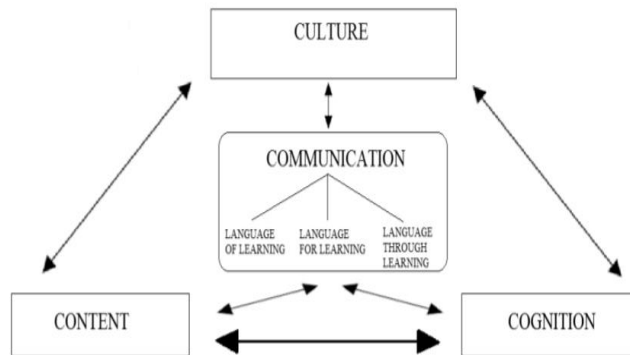
Kalogerakou et al.'s study (2017) affirmed the effectiveness of Coyle et al.'s (2010) modified CLIL model. This research demonstrated positive impacts on student achievement in both content and language proficiency, enhancing overall learning outcomes. Most importantly, students expressed satisfaction with the instructional activities and materials, highlighting the viability of 4 Cs framework and the language triptych- based approach for English language text-based content learning.

Based on prior research results, this present study employed Coyle et al.'s (2010) 4Cs framework as the framework for the customized teacher training.

Competencies of CLIL Teachers

Effective CLIL instruction requires a diverse skill set from teachers (Taylor, 2022). Scholars like Wagner (2009) and Hernández (2010) highlight the importance of comprehensive teacher education in CLIL. According to Ayapova et al. (2021), successful student learning in CLIL relies on strong content knowledge and pedagogical expertise. Various frameworks by Bertaux et al. (2010), Coyle et al. (2018), Favilli et al. (2013), Hernández (2010), Hurajova (2013), Marsh (1999), Marsh et al. (2010), and Novotna et al. (2001) identify key competencies for CLIL teachers, including effective communication, classroom management, methodological proficiency, and the dual ability to teach content and language effectively (Marsh, 1999).

The European Framework for CLIL Teacher Education (EFFCTE), as mentioned by Coyle et al. (2018), identifies key characteristics which are integrated content and language learning, bilingual competence, collaborative

teaching, intercultural awareness, assessment of integrated learning, and classroom management. Sanchez-Melendez's (2020) research revealed that content teachers need such competencies to create new materials, adapt existing ones, and construct an integrated curriculum based on CLIL. Moreover, in today's digital era, a comprehensive toolkit for CLIL educators must include proficient internet research skills, as highlighted by Raitbauer et al. (2018).

In addition to the basic principles, Marsh and his colleagues introduced a new set of competencies based on the idealized competencies under the EFFCTE (Marsh. et al.'s, 2011) which includes CLIL fundamentals, content and language awareness, methodology and assessment, learning resources and environments, CLIL classroom management, research and evaluation, and personal reflection (Coyle. et al., 2018). The CLIL teachers' competencies are also adopted to create needs analysis questionnaire to identify the training contents in this study.

CLIL and the Teacher Training

Studies on CLIL teacher training show significant improvements in teacher competencies. Nguyen and Nguyen (2019) reported enhanced language proficiency, pedagogical knowledge, and confidence in CLIL methodologies, particularly using the 4Cs framework. González-Lloret and Ortega-Martn (2021) found increased motivation, classroom engagement, and improved practices following CLIL training. Similarly, Cenoz et al. (2014) showed teacher confidence in teaching content in a second language. Challenges like limited resources, time constraints, and the need for ongoing support and mentoring have also been identified (Urmeneta & Walsh, 2017). Addressing these, effective training model is essential for successful CLIL teacher training.

Smith (2020) gave importance to evaluating the teacher training model through reflections from teacher trainees. These reflections often include insights into their experiences, challenges, and perceived effectiveness of the training, providing valuable feedback on the strengths and areas for improvement in the educational approach. This notion is congruent with Brows' suggestion (2019) stating the CLIL teacher training's success can be reflected in trainees' positive feedback and engagement in their training.

This study aimed to explore how a customized CLIL teacher training program impacted biology teachers' competencies, specifically in English language proficiency, content knowledge, and classroom pedagogy. Before the training, a preliminary needs analysis was conducted, and the collected data informed the creation of the training topics. These topics were integrated with a core training framework based on Coyle et al.'s (2010) CLIL model.

Subsequently, the model underwent evaluation by three experts. Following this, the teacher training, involving eight teachers and a trainer, was conducted.

Needs Analysis (NA)

This study employed Coyle et al.'s (2010) CLIL model integrating 4Cs and language triptych. Considering Myanmar's educational context, addressing context-related issue is vital for teacher training, as advised by Coyle (2019), John (1991) and Ulla (2018a). Therefore, a preliminary needs analysis (NA) was conducted to ascertain the specific requirements of upper-secondary biology teachers. This is in accordance with recommendations from scholars such as Brown (2019) and Smith (2020).

NA involved 121 upper-secondary biology teachers in Myanmar, focusing on Grade 10 teachers using textbooks in the English language. The samples were biology teachers because biology being a suitable content subject to initiate CLIL, was classified under hard science (Becher's taxonomy of disciplines, 1989). Convenient sampling and voluntary participation were employed. A questionnaire based on CLIL principles was distributed via Google Forms to elicit data from teachers. Validated through pilot studies and expert reviews, the questionnaire covered teachers' personal information, their knowledge, and skills in managing current teaching challenges, and their CLIL training needs.

NA identified gaps and priorities among upper-secondary school biology teachers for CLIL training. In this study, the needs of three different groups were investigated. Highly-experienced teachers lacked skills in teaching content subjects in English but recognized the importance of CLIL basics and language integration. Experienced teachers also needed to use authentic materials and assess student language skills. Less-experienced teachers required fundamental CLIL principles, language proficiency, and effective classroom management. The proposed CLIL teacher training model was adapted to address these findings by including the teaching contents in the teacher training model.

The Customized CLIL Teacher Training

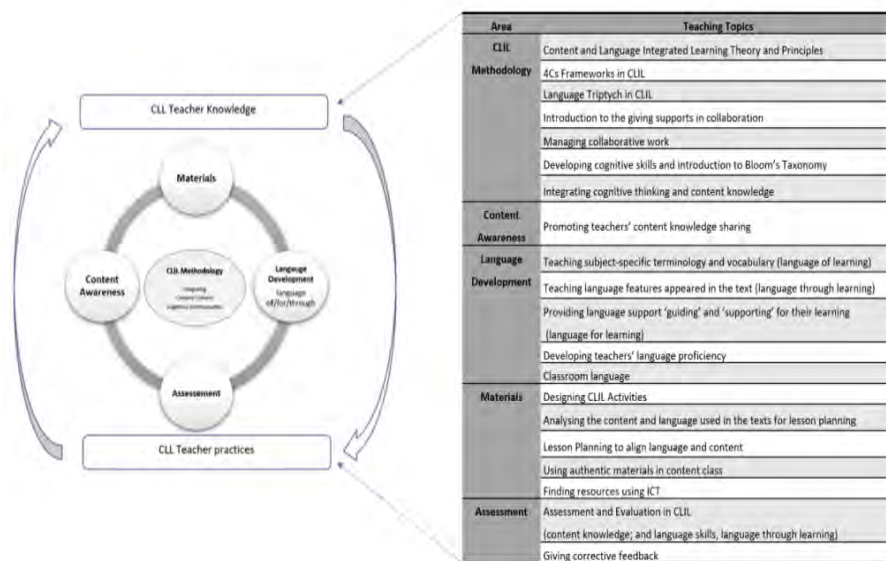In the customized CLIL teacher training model, the framework was adapted from the Coyle's 4Cs referring to the previous literature. In addition, based on the NA, the teaching contents or topics were created.

The customized CLIL framework has been designed based on modified CLIL model of Coyle and others. (Coyle et al., 2010). A good combination of the CLIL principles and practice and CLIL framework would

lead to the development of the CLIL teacher training model for this study. The framework consists of five essential elements, representing competencies needed for CLIL teachers. Two of them: content awareness and language development are the basic concepts of CLIL and the others are crucial in the teaching learning process. Language development can be done through the use of language triptych. The middle one, CLIL methodology is concerned with integrating 4Cs, basic principles of CLIL in a content lesson. It is also realized that the teachers need to develop the knowledge and have chances to apply the knowledge in their actual practices. In this model, it is intended to share the knowledge and help the teachers apply their knowledge in their actual practices. Figure 2 outlines the key elements of the model.

Figure 2

The Contextualized Proposed CLIL Teacher Training Model

As the customized CLIL teacher training model is based on NA results, it aligns with the knowledge and skills needed for teacher participants in a specific training situation. This makes the developed model different from the ones in the previous studies.

Before conducting the CLIL teacher training, the model was validated by two CLIL experts and an experienced biology teacher to ensure it was ready for implementation, effectively equipping CLIL teachers in Myanmar.

Research Methodology

This mixed-methods study aimed to find out what the teachers thought about how a recently created CLIL teacher training model affected their competencies as upper-secondary school content teachers in Myanmar.

Participants

Eight Grade 10 biology teachers from Myanmar participated in this study. A certified SEAMEO-RELC CLIL specialist, one of the researchers of this study, conducted the training as a teacher trainer. The eight teachers were selected through convenience sampling from 121 volunteers who initially took part in the preliminary needs analysis. They came from three different provinces and were chosen for their availability and willingness. The training included CLIL concepts, engaged in questionnaires and interviews, and micro-teaching sessions. Participants were categorized into three groups: highly experienced (10+ years), experienced (4-9 years), and inexperienced (less than 4 years), reflecting their varied teaching experience. This grouping was crucial because a teacher's efficacy and willingness in adapting innovative teaching strategies could vary with their level of teaching experience as supported by scholars such as Prieto and Altmaier (1994) and Tschannen-Moran and Woolfolk-Hoy (2007). Ethical guidelines were followed, with all participants fully informed and consenting to join the study.

Tools and Data Collection

The research introduced the customized CLIL teacher training model and integrated it into the training. The teaching plan of the training topics can be seen in Table 1:

Table 1

Teaching Plan of the CLIL teacher training

Week 1		
Day 1	Content and Language Integrated Learning Theory and Principles	Knowledge Sharing Phase
Day 2	4Cs Frameworks in CLIL	
Day 3	Language Triptych in CLIL	
Day 4	Promoting teachers' content knowledge sharing and language proficiency	
Day 5	Lesson Planning to align language and content	

Week 2		
Day 1	Micro-teaching session 1	
Day 2	Analysing the content and language used in the texts for lesson planning	
Day 3	Teaching subject-specific terminology and vocabulary (language of learning) and teaching language features appeared in the text (language through learning)	
Day 4	Managing collaborative work and providing language support 'guiding' and 'supporting' for their learning (language for learning) and classroom language	Application Phase
Day 5	Integrating cognitive thinking in CLIL and introduction to Bloom's Taxonomy in thinking skills development	
Week 3		
Day 1	Designing CLIL worksheet and activities	
Day 2	Using authentic materials in content class and finding resources using ICT	
Day 3	Assessment and Evaluation in CLIL (content knowledge; and language skills, language through learning)	
Day 4	Providing corrective feedback	
Day 5	Micro-teaching session 2	

This study implemented a 60-hour CLIL teacher training, validated and approved by experts, focusing on the appropriateness of the training model and content. The training consisted of two phases: knowledge-sharing and application. Activities included lecturers and group discussions primarily in English, with occasional use of Myanmar for clarity. Teachers assessed their professional development through questionnaires and self-evaluation reports, receiving regular corrective feedback from the researcher (trainer). At the end of the training course, the teacher trainees were asked to give responses to in-depth interviews to investigate their needs in their understanding and performance in CLIL during the course.

Data collection in this study used three methods using five tools. They were a pre-implementation questionnaire, a post-implementation questionnaire, a pre-implementation semi-structured interview, a post-implementation semi-structured interview, and micro-teaching self-evaluation form.

Initially, the pre-implementation questionnaire and post-implementation questionnaire comprised three parts each. The pre-implementation questionnaire had 25 questions in three parts: Part I –

Personal details, including teaching experience; part II – 22 4-Likert-scale questions on CLIL knowledge and skills, from "unknowledgeable" to "highly knowledgeable."; and part III – Open-ended questions about their expectations and feedback on the training. On the other hand, post-implementation questionnaire reflected changes in knowledge and skills after the training in first two parts. However, part III questions differed, focusing on knowledge gained and the fulfillment of expectations. Both questionnaires were validated by experts, and a pilot test with 20 teachers confirmed their reliability.

Secondly, the semi-structured pre-implementation interview gathered in-depth insights into teacher trainees' knowledge and perceptions of CLIL before the training. There were four parts: general information, current teaching practices, current CLIL knowledge and skills and expectations. The post-implementation interview explored teachers' CLIL knowledge, classroom application, and opinions on the training. The questions were divided into three parts: CLIL knowledge and application of CLIL, opinions on the training's theory, practice, materials, activities, management, and assessment; and their overall impressions, willingness to use CLIL, and suggestions. The experts reviewed the questions to ensure consistency and reliability. Individual interviews were conducted before and after the course, recorded, and translated into English. An English teacher and teacher trainees checked the translations for accuracy.

The third method was micro-teaching self-evaluation, which comprised four main questions on knowledge application, teaching reflection (planning, preparation, and delivery), satisfaction (rated a 4-point Likert scale), and suggestions for improvement. This report was used in two micro-teaching sessions.

Teacher trainees completed pre-implementation and post-implementation questionnaires to reflect their understanding of CLIL theory and practice. Interviews were conducted at the beginning and end of the course to confirm their perceptions. Additionally, two micro-teaching sessions were held: one after the knowledge-sharing phase and another at the end of the course, to evaluate their satisfaction with applying CLIL in their teaching. See Table 2.

Table 2

Data Collection in and after the Training Period

Knowledge sharing phase		
Week	**Activity**	**Data Collection Tool**
Week 1 (Day 1)	Lectures/Activities	pre-implementation-questionnaire
		pre-implementation-interview
Week 2 (Day 1)	Micro-teaching	micro-teaching self-evaluation
Application Phase		
Week	**Activity**	**Data Collection Tool**
Week 3 (Day 5)	Mmicro-teaching	micro-teaching self-evaluation
Week 3 (Day 5)	Lectures/Activities	post-implementation-questionnaire
End of the course		post-implementation-interview

Data Analysis

The study used a three-stage analysis method based on Creswell (2009), incorporating both quantitative and qualitative approaches.

In the initial phase, data from both pre- and post-training questionnaires were statically analysed with Mean score of each item to investigate the perceptions of the customized CLIL teacher training modal's impact on the development of their competencies, specifically English language, content knowledge, and CLIL pedagogical development. In the subsequent stage, the qualitative data from pre- and post-implementation interviews were analysed through content analysis in order to triangulate the quantitative results. The attitudes and perceptions of the teachers regarding the overall impact of the teacher training on their professional competencies were also investigated through the data of the interviews. Lastly, micro-teaching self-evaluations were analyzed to investigate the perceptions of its' effect on the development of their professional competencies.

The qualitative data analysis was done through three main steps for a systematic data categorization and interpretation (Creswell, 2009). The qualitative analysis involved three steps: transcribing data in Myanmar,

translating it into English, and organizing it into the prescribed thematic charts. This systematic process facilitated classification and interpretation.

Results

Personal Details of the Teachers

All eight participants voluntarily joined the CLIL teacher training and were Grade 10 biology teachers in government secondary schools in Myanmar. They had all previously participated in NA. Among them, three (TT 5,7, and 8) had over ten years of teaching experience, three (TT 1, 4, and 6) had four to nine years, and the remaining two (TT 2 and 3) had less than four years teaching experience. They were further categorized into three groups based on their teaching experience: Group1 - Highly experienced (10 years and above); Group2 - Experienced (4-9 years); and Group3 - Less-experienced (less than 4 years).

Teachers' Perception of the Effect of the Customized CLIL Teacher Training Model on Competency Development

Teachers' Knowledge and Skills of CLIL before and after the Training (Quantitative Data)

The analysis of pre-implementation and post-implementation questionnaires indicated improvement in the teacher trainees' CLIL proficiency, with minor variations. Mean scores for 22 items, based on a four-point rating scale, were calculated and interpreted to reflect this progress as follows:

3.51 – 4.00 means "highly knowledgeable/skilful"
2.51 – 3.50 means "knowledgeable/skilful"
1.51 – 2.50 means "somewhat knowledgeable/skilful"
1.00 – 1.50 means "unknowledgeable/unskilful"

Data highlights perceived improvements in various teaching-related knowledge and skills after the course. The findings are presented in Table 3.

Table 3

Interpretation of the Data through the MEAN Differences

Item No.	Group 1			Group 2			Group 3		
	Pre-Mean	Post-Mean	*Mean Score Differences*	Pre-Mean	Post-Mean	*Mean Score Differences*	Pre-Mean	Post-Mean	*Mean Score Differences*
1	1.0	4.0	*3.0*	1.0	4.0	*3.0*	1.0	4.0	*3.0*
2	1.0	4.0	*3.0*	1.0	4.0	*3.0*	1.0	4.0	*3.0*
3	1.0	3.7	*2.7*	1.0	4.0	*3.0*	1.0	4.0	*3.0*
4	3.1	3.3	*0.2*	3.0	3.3	*0.3*	2.0	4.0	*2.0*
5	1.4	1.4	*0.0*	1.3	3.3	*2.0*	2.0	4.0	*2.0*
6	1.4	1.4	*0.0*	2.0	2.0	*0.0*	2.0	4.0	*2.0*
7	1.6	3.3	*1.8*	2.3	3.7	*1.3*	1.0	3.0	*2.0*
8	1.0	3.0	*2.0*	1.0	3.3	*2.3*	1.0	3.0	*2.0*
9	2.0	2.0	*0.0*	1.3	3.7	*2.3*	2.0	4.0	*2.0*
10	2.0	2.0	*0.0*	1.7	1.7	*0.0*	1.0	3.5	*2.5*
11	1.0	1.0	*0.0*	1.3	1.3	*0.0*	1.0	3.0	*2.0*
12	1.4	2.7	*1.2*	1.3	3.7	*2.3*	1.5	3.5	*2.0*
13	1.0	3.0	*2.0*	1.3	3.7	*2.3*	1.0	3.5	*2.5*
14	1.0	3.7	*2.7*	1.0	4.0	*3.0*	1.0	4.0	*3.0*
15	1.4	4.0	*2.6*	1.0	3.7	*2.7*	1.5	4.0	*2.5*
16	1.4	1.7	*0.2*	1.3	3.3	*2.0*	1.5	3.5	*2.0*
17	1.6	3.7	*2.1*	1.7	1.7	*0.0*	1.5	3.5	*2.0*
18	1.0	3.7	*2.7*	1.3	3.7	*2.3*	1.0	3.0	*2.0*
19	3.0	3.0	*0.0*	2.3	2.3	*0.0*	2.0	4.0	*2.0*
20	1.0	1.0	*0.0*	1.0	1.0	*0.0*	1.0	4.0	*3.0*
21	1.0	3.3	*2.3*	1.0	3.7	*2.7*	1.0	4.0	*3.0*
22	1.9	2.0	*0.1*	1.7	3.3	*1.7*	1.5	3.5	*2.0*

The 22 items are listed in Table 4.

Table 4

Items of the questionnaires

Item No.	Teaching-related knowledge and skills
1	Content and Language Integrated Learning Theory and Principles (CLIL)
2	4Cs Teaching Framework in CLIL: Content, Cognition, Cultural and Communication
3	Language Triptych in CLIL: Language of, Language for and Language through learning
4	Target Content Knowledge
5	Target language proficiency
6	Bloom's Taxonomy on cognitive skills
7	Conducting collaborative activities
8	Assessment and Evaluation in CLIL
9	Classroom management techniques and classroom language
10	Finding resources using information technology
11	Choosing appropriate teaching materials for a particular lesson
12	Analysing the content and language used in the texts
13	Integrating content and language in a lesson
14	Designing CLIL worksheet and activities
15	Lesson planning in teaching content subject written in English
16	Using cognitive thinking development activities
17	Using collaborative activities to upgrade the communication skills
18	Providing language support 'guiding' and 'supporting' in collaborative work
19	Assessing the students' content knowledge development
20	Assessing the students' language skills development
21	Assessing both content knowledge and language skills development of the students
22	Providing Corrective feedback

The highly experienced teachers perceived improvements in several areas. For instance, their knowledge of "Content and Language Integrated Learning Theory and Principles (CLIL)" and the "4Cs Teaching Framework in CLIL" saw a notable increase, with mean score differences of 3.0 each,

moving from 1.0 to 4.0. Similarly, their skills in "Designing CLIL worksheet and activities" improved substantially, from a pre-mean of 1.0 to a post-mean of 3.7, a difference of 2.7. However, there was no change in their "Target language proficiency," "Bloom's Taxonomy on cognitive skills," "Classroom management techniques and classroom language," "Finding resources using information technology," "Choosing appropriate teaching materials for a particular lesson," "Assessing the students' content knowledge development," and "Assessing the students' language skills development," all of which remained at 0.0.

The experienced teachers reported improvements. For "Content and Language Integrated Learning Theory and Principles (CLIL)" and "4Cs Teaching Framework in CLIL," they experienced a substantial increase from 1.0 to 4.0, marking a mean score difference of 3.0. In "Analyzing the content and language used in the texts," "Integrating content and language in a lesson," "Providing language support in collaborative work," "Classroom management techniques and classroom language," they improved from a pre-mean of 1.3 to a post-mean of 3.7, a difference of 2.3. In contrast, there was no improvement in their "Finding resources using information technology," "Choosing appropriate teaching materials for a particular lesson," "Assessing the students' content knowledge development," and "Assessing the students' language skills development," all of which remained at 0.0.

Less-experienced teachers made improvement across multiple areas in CLIL training. They notably improved in understanding CLIL Theory and the 4Cs Teaching Framework, Target Content Knowledge, Target Language Proficiency, Bloom's Taxonomy on Cognitive Skills, and assessing both content knowledge and language skills development of students, with marked improvements from initial scores to 4.0 in each category, showing a difference of 3.0, the highest improvement observed across all groups.

All teachers perceived improvements in their knowledge and skills related to CLIL. Teachers showed improvement in understanding "Content and Language Integrated Learning Theory and Principles" and the "4Cs Teaching Framework," both increasing from 1.0 to 4.0. Their ability to design CLIL worksheets and activities also improved substantially, particularly among highly experienced and less-experienced teachers. Less-experienced teachers made notable progress in assessing both content knowledge and language skills, reflecting enhanced teaching proficiency, with scores rising by 3.0 points, reflecting a significant enhancement in their overall teaching proficiency. Notably, there was considerable variation in teachers' responses, as evidenced by the mean differences of each group in many areas of the post-

implementation questionnaire. This variation suggests diverse individual experiences. Overall, the training effectively enhanced teachers' CLIL competencies across various areas, as indicated by quantitative data.

Moreover, qualitative data supported the quantitative analysis to comprehensively present the impact of CLIL teacher training on teachers' perceptions of competency improvement. This was achieved through pre- and post-implementation interviews, and micro-teaching self-evaluations.

Teachers' CLIL Knowledge and Skills before the Training (Qualitative Data)

The highly experienced teachers showed confidence in their content knowledge but acknowledged the need for more theoretical background, as stated by a teacher (TT5) in the Extract: *I want to use CLIL but I need more theoretical background, so I want more explanation. Then, I can do better."*

In general, the teachers effectively managed classrooms, primarily using Myanmar as their main instructional language. Being highly experienced, they were good at managing classroom with Myanmar as the medium of language. A teacher's response (TT 8) showed how a classroom was managed, saying that "*I use Myanmar all the time. my class is obedient and I can manage it well."*

However, the highly experienced teachers generally accepted that they were unable to assess the target language proficiency. A teacher's response (TT 7) showed how a test has been used to assess only students' content knowledge in *"We can use English-written test to assess content knowledge development…it is a must...but we didn't ass their language and also grammar..we have no idea about it."*

The experienced teachers felt assured of their content knowledge and proficiency in teaching vocabulary. However, they lacked confidence in language skills assessment as expressed by one of them (TT 4) in *"I feel comfortable with the content knowledge, especially vocabulary. But when it comes to assessing it in English, I need more guidance"* .

The teachers could manage the class successfully in the Myanmar language though they could not use English. It was shown in the Extract of a teacher (TT 1) *"I can now manage my class well…. using Myanmar language…I want know how to give instructions in English".*

Teachers focused on content development, neglecting language skills. They could not assess or give feedback on language skills and used class-wide feedback in Myanmar for content. The extracts of two teachers (TT 4) and (TT 6) detail this approach: *I tested content knowledge only and gave class-wide feedback in*

Myanmar, with no time for individual feedback."" (TT4) and *"When students gave wrong answers. I corrected/ I gave them the correct one…just orally to the whole class."* (TT6)

The inexperienced teachers felt confident in their content knowledge and classroom management but struggled with teaching in English, especially in forming questions and managing group work. This is highlighted by one teacher TT 2 in the Extract *I've some confidence in handling my subjects and managing the class, but I'm not sure that group activities are productive."*

One teacher showed that, despite having experience with collaborative work, it was still difficult to provide the necessary guidance and support to conduct it successfully. The extract is of her was *"I tried to conduct group work but it was not successful…because of my guidance and support.".*

Teachers' CLIL Knowledge and Skills after the Training (Qualitative Data)

The highly experienced teachers recognized the value of CLIL theory, practice, language triptych, lesson planning, and creating CLIL worksheets and activities. They also developed skills in assessing both content knowledge and language proficiency. Despite improvements, they expressed a need for more theoretical background, as highlighted by a teacher (TT5): *"I now understand and can apply CLIL, but I need more theoretical background. I want the teacher [trainer] to explain more. I understand how to assess both content and language and give corrective feedback."*

A teacher, demonstrated positive shifts in her understanding of CLIL's effectiveness in teaching content lessons and assessment, as stated by a teacher (TT 7): *I now understand how CLIL can be done. I want to try CLIL teachers in the content class and also do assessment. It is effective."*

Furthermore, the following extract from a teacher's response (TT 5) showed positive perception regarding the ability to construct instructional materials. *"Well my skills of designing teaching materials and lesson planning have developed after the course."*

Additionally, teachers in this group expressed confidence in their skills related to lesson planning using CLIL and designing CLIL worksheets, believing these skills were valuable for content teaching.

One teacher (TT 7) had a competence in conducting collaborative works, particularly when providing assistance and instructions in English due to language proficiency: *"I can manage groupwork in Myanmar, but I struggle to give all instructions in English, due to my limited language proficiency."*

The experienced teachers reported improvement in their CLIL knowledge. They excelled in CLIL basic principles, language triptych, lesson planning in teaching content subjects written in English using CLIL,

designing CLIL worksheets and activities, conducting collaborative activities, cognitive skills development, and CLIL assessment.

They reported having a strong understanding of integrating content and language teaching using CLIL theory. They were satisfied with their newfound skills in constructing materials and lesson planning, as a teacher (TT 1) noted in her response: *"I understand CLIL and I'm totally satisfied with lesson planning that I learned in the course…Now I can draw effective lesson plans for my lesson."*

The following extracts showed progress in analyzing language in content texts and using online resources. A teacher's (TT 1) response indicated effective assessment of both content and language skills with valuable feedback. A teacher (TT 4), confident in group and pair work, sought additional support in facilitating student discussions: *"I can now analyze language in texts and assess students' understanding and language skills effectively." and "I can conduct group work but need to support students better in their language use during discussions."*

For the cognitive skills development, a teacher's response (TT 1) proved knowledge development and perceptions of applying the knowledge in classroom: *"I knew Bloom's taxonomy, but this course deepened my understanding. I can now create critical thinking-level-questions and will use them in my teaching."*

At first, the teachers had no experience in creating worksheet and planning CLIL lessons yet through the practice phase, they learned how to create them effectively. Through the of a teacher's response (TT 1), the perceptions of their development and application of the skills can be seen in *"I satisfied with lesson planning that I learned in the course…Now I can draw effective lesson plans and also create worksheets for my lesson."*

Inexperienced teachers noted improvements in several CLIL areas: basic principles and language triptych, lesson planning in content subjects, designing CLIL materials, analyzing content language, developing cognitive skills, facilitating collaboration, CLIL assessment, and providing corrective feedback.

Initially finding CLIL theory complex, they later recognized its practicality and effectiveness, as shown in the response by (TT 2): *I didn't like theory. When I learned CLIL, I changed my attitude. CLIL is very practical and possible to use in my class."*

The extract, given by a teacher (TT 2), showed improvement in CLIL worksheet and activity creation and lesson planning skills: *"I can now analyze language well. I've learned to plan and develop CLIL lessons effectively, create worksheets, and use the Internet for finding resources, especially in ICT."* It was also found that they improved in micro-skills like analyzing language in content texts and finding online resources.

The teachers improved in promoting students' critical thinking through a better understanding of Bloom's Taxonomy and also in conducting collaborative works, as evidenced in a teacher's response (TT 3): *"I now understand Bloom's taxonomy better and can create critical skill-level questions, as well as facilitate peer learning and group work."*

A teacher (TT 3) expressed a basic understanding of assessment and giving feedback, yet expressed a desire for deeper learning due to challenges faced in using the target language: *"I gained the knowledge of CLIL assessment and giving corrective feedback. I want to use them in my class, but I need to learn more."*

Fulfillment of Their Expectation

At the beginning of training, in their interview, all teachers expressed eagerness to learn CLIL knowledge and skills, basic principles, language triptych, lesson planning, and designing CLIL activities.

> *"I'm very interested in the CLIL theory and want to know more"* (TT 7-*highly experienced*)"

> *"I want to learn the language structures used in the text, so I can teach the students language skills, really useful in content teaching"* (TT 4, *experienced*), and

> *"CLIL basic principles and language triptych is good for us, and I believe I could learn much about it."* (TT 8-*highly experienced*).

By the end of the training, interviews and micro-teaching evaluations indicated that most teachers felt their expectations were fulfilled, with some variations based on their teaching experience. Based on the extracts: *"I learned the 4Cs. I can definitely apply the knowledge in my teaching."* (TT 5, *highly-experienced*), *"This class exceeded my expectations. Not only did I want to learn the CLIL, but I can apply it into practice in the classroom."* (TT 4, *experienced*), *"I now know to search the internet for finding resources"* (TT 1, *experienced*), and *"I can now draw an effective lesson plan in CLIL that's what I expected."* (TT 3, *inexperienced*), it was seen that the teachers found their CLIL training met their expectations in various areas: CLIL principles, lesson planning, and material design, but experienced teachers wanted more language teaching training and saw limited English improvement. A teacher mentioned that her expectation about target language teaching and English proficiency were not entirely met due to time constraints *"Before the course, I was eager to learn teaching the target language and improve my English. I learned some, but I needed more."* (TT 5, *highly-experienced*). Similarly, the experienced teachers were pleased with CLIL principles, lesson

planning, and resource finding but felt the training fell short in improving English proficiency and target language teaching. The inexperienced teachers were satisfied with CLIL principles and activity design but found the training fell short in target language teaching.

Teachers' Comments on the Model and the Training

In this section, results are categorized based on seven themes identified in the qualitative data.

Framework and Teaching Contents

The teachers commented positively on the training framework, stating it was well-structured, *"The contents were sufficient. It is new, but I learned with full interest."* (TT 5, *highly experienced*). Overall teachers found the training structure suitable for introducing them to CLIL theory and practice.

Balancing Theory and Practice

A highly experienced teacher said, "…*challenging to understand the theory initially due to the volume of content in a short time.*" (TT 7). This indicates feeling overwhelmed and the need to balance theory with practice. Another teacher expressed a desire to understand theory better before applying it practically: "*I want to learn more theory for a better foundation before applying it practically.*" (TT 8, highly experienced)

Teaching Materials

Teachers appreciated the teaching materials customized to their needs. They were practical, appropriate, and encouraging of creativity, often inspiring teachers to develop their resources: *"The materials are appropriate for us. They can meet the intended objectives of a lesson…"* (TT 7, *highly experienced*)

Teaching Activities

The training incorporated learning activities and teaching methods centred on communicative and collaborative skill development. These activities were well-received, with participants finding them effective and motivating. A teacher (TT 2, *inexperienced*) said *"Teacher gave clear instructions. It makes me fun and practical.".* Collaborative activities, rather than traditional lecturing, were frequently employed.

Assessment

The training used formative self-assessment methods. Teachers expressed satisfaction with this approach. They indicated a willingness to implement similar assessment methods in their classes by saying *"I'm impressed with using rubrics in assessing us. I'll study more about it and I will use it."* (TT 6, *experienced*)

Duration and Time Allocation

The highly experienced teachers recommended adjusting course duration and content allocation. A teacher (TT 5) expressed a desire for more theory explanation, while experienced teachers like (TT 6) wanted additional guidance and support during the practice phase in her extract, *"I'm satisfied with my learning, but I expected to receive more guidance in the practice stage as all trainees have never done anything like this before."* (TT 6, *experienced*)

Holistic Learning

All the trainees felt the training provided holistic learning. The following extracts proved it: *"The training model was very appropriate for us, and the course is fun learning."* (TT 2, *inexperienced*) and *"I realize how lucky I was to end up in the class. It has been my most favourite class."* (TT 3, *highly experienced*).

Discussion

Highly experienced teachers confidently apply CLIL principles and the language triptych in their teaching, yet face challenges in facilitating collaboration and assessing student performance. In contrast, inexperienced teachers excel in collaboration. Overall teachers struggle with English language usage in their CLIL classes. This indicates that teachers cannot meet Soe and Myint's (2020) suggestions for using English as a medium of instruction in Myanmar classrooms. This study suggests that specific aspects of English language knowledge and skills, collaboration in classroom practice, cognitive skills, and assessment of students' language proficiency must be focused on CLIL teacher training in Myanmar. This is surprisingly different from Sanchez-Melendez's (2020) study giving importance to the macro level of CLIL teacher training such as creating CLIL learning materials, adapting the existing CLIL to match the learners, and developing the CLIL curriculum. Teachers' expectations in CLIL proficiency, lesson planning, and activity design are largely met, but shortcoming persists in target language instruction and English proficiency, echoing Dalton-Puffer's (2007) concern. Since

language proficiency significantly impacts teacher confidence and learning outcomes, future CLIL training must prioritize comprehensive language support to bridge these gaps.

Teachers also show a positive view of CLIL training and its teaching model, covering content, materials, activities, management, and assessment. This contrasts with Ayapova et al.'s (2020) findings stating that CLIL training might not be effective and might not serve the trainees' needs. The findings of this present study strongly confirm Johns' (1991) notion pinpointing that it is essential to conduct needs analysis before training.

A key finding was that trainees unanimously found the training satisfying their needs. This is similar to Cenoz et al.'s (2014) research on CLIL's transformative impact on teachers' attitudes and beliefs.

Conclusion

This study explored the impact of customized CLIL teacher training on competency development of teacher trainees, particularly upper-secondary biology teachers in Myanmar. The findings indicate that the training was well-received and perceived positively, with improvements noted in both pedagogical and CLIL knowledge competencies. The theoretical implications include a deeper understanding of the effectiveness of integrating content and language learning frameworks such as CLIL, specifically within the context of Myanmar's educational context.

These insights contribute to the field of CLIL teacher education by highlighting the importance of customized training models that consider the unique linguistic and educational contexts of teachers.

However, the study has limitations that should be addressed in future research. The relatively small sample size and the focus on biology teachers from only three districts may not fully represent the experiences of all teachers in Myanmar or across other disciplines. Future studies should consider expanding the sample size and including teachers from various disciplines and regions to obtain a more comprehensive understanding of the impact of CLIL training. Additionally, a longitudinal approach would be beneficial to assess the long-term effects of such training on teacher competencies and student outcomes.

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