AMERICAN UNIVERSITY OF BEIRUT

THE USE OF TRANSLANGUAGING IN A LEBANESE MULTILINGUAL SCIENCE CLASSROOM TO ENACT COGNITIVE, SOCIAL, AND TEACHING PRESENCES

by
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ABSTRACT
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In many countries around the world, and some in the Arab region, such as Lebanon, science is taught in a foreign language (e.g., often English or French) rather than in students' home language (Arabic, in the Arab region). The use of a foreign language as the language of learning and teaching is assumed to be one of the major reasons for students' underachievement in science not only in the Arab world (BouJaoude & Dagher, 2009), but also in Africa (Reddy et al., 2016) and the United States (Thomas & Collier, 1997). Translanguaging (TL) has been suggested as a pedagogical strategy to support multilingual learners (MLLs) more than two decades ago; however, it is under-researched in the science classrooms, particularly in the Arab world. This study aims to explore how TL is used in a Lebanese multilingual science classroom and what functions TL plays in the enactment of the cognitive, social, and teaching presences as characterized within the Community of Inquiry (CoI) framework. A multilingual middle school physics classroom at a low SES Lebanese private school with an official English-only policy for the teaching of science was recruited for this study. Data was collected from several sources: video recordings of physics sessions over a period of four weeks, teacher and students' responses to the CoI survey, and semi-structured interviews. The video recorded sessions were fully transcribed and coded at three levels: the category indicators of each presence type within the CoI framework, the language(s) used (English-only, Arabic-only, or Mixed), and the speaker (teacher or student). Then, the percentage of the instances of occurrence of each presence, its categories, and indicators were determined. The percentage of the language(s) used at the level of each presence indicator was also calculated. Survey results were used to calculate the average occurrence of each presence as perceived by the teacher and the students using a Likert scale from 1 to 5. The interviews were audio-recorded, transcribed, and thematically analyzed. The findings illuminate an alignment between the findings of the different data sources. Teaching presence dominated the learning environment in the studied classroom. TL was spontaneously used by both the teacher and the students as an agentive resistive act to the English-only school policy. For each presence type, TL appeared to serve several functions. For instance, TL was found to be crucial for students' enactment of the three presences. For instance, for cognitive presence, TL was found to promote the engagement in higher-order thinking skills, such as reflection. The teacher and students translanguaged, primarily using their home language, to enact their social presence through affective expression, interpersonal relationships, and group cohesion. As for teaching presence, the teacher translanguaged for various purposes, primarily to support students' conceptual understanding of abstract physics concepts, eliciting his agentive and resistive response to the prevailing English only school policy. In accordance with these findings, the teacher and the students emphasized the importance of deploying TL in the physics classroom. They posited that TL was the preferred, resourceful, just, and culturally sustaining pedagogy. As such, the study concluded that TL can potentially promote the manifestation of cognitive, social, and teaching presence. Recommendations were suggested for future research, practice, and policy.

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ABBREVIATIONS

Abbreviation	Definition
CoI	Community of Inquiry
CP	Cognitive Presence
SP	Social Presence
TP	Teaching Presence
T	Teacher
S	Student
Ss	Students
S(same)	Same student talking
MSA	Modern Standard Arabic
MLLs	Multilingual learners
ELLs	English Language Learners
TL	Translanguaging
LD	Lebanese Dialect
TE	Triggering Event
EX	Exploration
IN	Integration
RE	Resolution
AF	Affective Expression
IN	Interactive category of social presence (also referred to as Open Communication)
GC	Group Cohesion
DO	Design & Organization
FD	Facilitating discourse
DI	Direct Instruction
LoLT	Language of learning and teaching

CHAPTER 1

INTRODUCTION

Background and Rationale

Recent educational reforms underscore scientific literacy as a major goal of science education (NRC, 2012; NGSS Lead States, 2013). An essential aspect of scientific literacy is the understanding of science as content and as a set of knowledge-building practices (NRC, 2012). However, science is perceived as a challenging and linguistically demanding school subject (González-Howard & McNeill, 2019; Lee, Quinn, Valdés, 2013) towards which students exhibit declining interest (Murphy & Beggs, 2003) and low motivation to learn (Braund, 2009; Sjøberg, Schreiner, 2010). This challenge is intensified for students transitioning from elementary school to middle school, where science becomes more specialized and makes use of a more specialized technical discourse (Hurd et al., 1981). For instance, students encounter around 2,500 novel science terms in the science textbooks as they transition through grades six to nine (Hurd et al., 1981). The high technicality of the subject evokes rote memorization rather than deep understanding; thus, alienating children from science and contributing to the development of negative attitudes towards science (Songer & Linn, 1991). Notwithstanding, the story doesn’t end here because even non-technical terms in science textbooks are also found to be difficult to comprehend by English language learners (ELLs) in middle school (Badreddine, 2019). So how can we design inquiry-based science learning environments that are linguistically inclusive and academically expansive?

One way to design, analyze, and evaluate inquiry-based learning environments is by using the Community of Inquiry framework (CoI) (Garrison, Anderson, Archer, 2000). This generic theoretical framework is based on the premise that successful learning occurs in a community that fosters higher-order thinking at the intersection of three key components: Cognitive Presence (CP), Social Presence (SP), and Teaching Presence (TP). CP is the most basic element in this model as it is indicative of learners' critical thinking and meaningful engagement with implications for academic achievement. It is defined as the degree to which learners critically engage in knowledge construction through meaningful collaborative communication. SP is the degree to which learners project their real identities, socially and emotionally, in the community. TP is the degree to which the teacher effectively designs educational environments and facilitates learners' engagement with the learning environment. Although the CoI framework was originally applied to computer-mediated communication and learning in higher education, Garrison (2017) argues that it works as a theory and framework that "must be viewed as a means to study collaborative constructivist educational transactions – be they in online, blended, or face-to-face environments" (Garrison, 2012, p.251). The generic yet coherent structure of the framework renders it applicable in formal and informal learning spaces, including K-12 and university-level education (Garrison, 2016). In fact, most researchers used the framework to study online higher education (e.g., Akyol & Garrison, 2008; Garrison et al., 2001; Rourke et al., 1999). Some researchers adopted the framework in blended learning settings (Garrison & Vaughan, 2008; Vaughan & Garrison, 2006; Villanueva, 2021; Villanueva et al., 2022). Nevertheless, so far, the framework hasn't been adapted to face-to-face settings.

The CoI framework is anchored in the socio-constructivist theory of learning, which entails that learners learn by actively constructing their knowledge through interacting with each other and with the learning environment (Vygotsky, 1978, 1986). Another key element of the socio-constructivist theory is the belief that language is the central tool that people use to communicate and construct meaning. However, the fact that around 40% of learners in the world do not have access to education in their primary language complicates the situation (Walter & Benson, 2012) and hinders the achievement of a common goal in recent educational reforms in science education, i.e., scientific literacy (National Research Council, 2012; NGSS Lead States, 2013). It also contradicts the vision of providing quality science education for all and raises issues of equity and diversity (Lee & Luykx, 2006).

Scientific literacy entails knowing science (e.g., understanding technical terms), doing science (e.g., engaging in inquiry), talking science (e.g., utilizing academic genres), and practicing the scientific habits of mind (e.g., critical thinking) (Lee & Fradd, 1998). It seems obvious that the enactment of these components necessitates the use of language which, from the perspective of the sociocultural theory of development and learning, is a tool that mediates thinking (Vygotsky, 1962, 1978). Hence, learning science means learning the language of science (Lemke, 1990). Compared to monolinguals, the challenge of science learning for multilinguals, who exhibit low proficiency in the language of learning and teaching (LoLT), is doubled as they struggle to master science concepts while learning the language of instruction. Unsurprisingly, the use of a foreign language as the LoLT has been considered to be one of the major reasons for students' underachievement in science in the Arab world (BouJaoude & Dagher, 2009), Africa (Reddy et al., 2016) and the United States (Thomas & Collier, 1997). This finding has been also associated with lower socioeconomic status (SES) in different countries around the world (UNESCO, 2016). In addition to underachievement, using a foreign language as the LoLT has also been linked to high repetition and dropout rates among West African students (Nikièma, 2011), Lebanese students, and refugees in Lebanon (Ministry of Education and Higher Education, 2021).

In response, Lee and Fradd (1998) assert that reformers and educators should reconceptualize their understanding of diversity and equity if their goal is really "Science for All". Teachers should embrace bilingual students' home language and cultural experiences and adapt their instruction to the students' background experiences. One suggested pedagogical strategy that caters to multilingual learners is translanguaging (TL) (García, 2011). TL is the process of using the full linguistic repertoire of multilingual learners to make meaning, shape their experiences, gain understanding, and construct knowledge (Baker, 2011). Tl is believed to have the potential to liberate multilinguals, and schools are the places where TL could have a huge impact (García, 2017).

However, there exists a controversy in literature on whether to use the term 'translanguaging' or 'codeswitching' when studying the linguistic practices of bi/multilingual learners and some researchers (e.g., Goodman & Tastanbek, 2020) call for a conceptual shift from codeswitching to translanguaging as the latter is based on a holistic view of languages and heteroglossic ideological premises. In this study, the term 'translanguaging' is used since TL is considered a broader and holistic framework that entails the linguistic practice of CS (Faltis, 2020; García, 2009; Macaro, 2009). Additionally, although TL scholars emphasize that a MLL has a unitary linguistic repertoire with no boundaries between named languages, they acknowledge that MLLs "can communicate only with features of their repertoire, those that respond to named languages" (García & Kleyn, 2016, p. 16). Hence, while rejecting the assumption that languages are rigid separate entities, TL still offers a room for naming languages as a methodological tool for strategic planning of languaging practices (Goodman and Tastanbek, 2020). Further, the participants in this study used the Lebanese dialect and English in addition to some Modern Standard Arabic and French that existed in their linguistic repertoire. They also engaged in multimodal interaction that included reading texts and figures, social conversing, writing science genres and informal texts – i.e., notes-, drawing figures, trans-registering, using various resources (e.g., textbooks, board, laptop, copybooks, voltmeter, lamps, batteries), and gesturing though the analysis in this study excluded the two latter modalities focusing on the languaging practices spoken, read, written, and drawn.

Recent empirical research studies illuminate the benefits for using TL in science classrooms. For instance, in face-to-face science classrooms, TL has been associated with enhanced communication, affective expression, cognitive engagement, sense-making of both science and the LoLT (Ryu, 2019), class participation, interactivity, motivation, and academic achievement (Charamba & Zano, 2019). Moreover, Licona and Kelly (2020), who examined how TL was employed in an English-Spanish dual-language middle school science classroom, also reported that TL afforded the teacher the flexibility to maintain classroom culture, facilitate students' learning, and frame scientific practices (e.g., argumentation). In online science learning settings, Song and Cho (2018) claimed that employing TL practices in scientific inquiry tasks promotes students' cognitive engagement, motivation, and metacognitive skills. Clark, Touchman, Martinez-Garza, Ramirez-Marin, and Drews (2012) also suggest that providing linguistic support in learners' primary language facilitates knowledge construction and sense-making in online inquiry tasks.

Nevertheless, notwithstanding these benefits, existing literature on attitudes toward pedagogical TL reveals that students (Wang & Shen, 2023) and teachers (Al-Bataineh & Gallagher, 2021) still have ambivalent attitudes toward TL. For instance, some researchers have reported that students may exhibit very positive (Moody et al., 2019), neutral (Fang & Liu, 2020), or mixed positions toward teachers' TL practices. Teachers as well exhibit mixed attitudes towards TL (Al-Bataineh & Gallagher, 2021), and may be reluctant to adopt pedagogical TL in classrooms for several reasons. For instance, in many contexts, using learners' primary language alongside the LoLT is considered a deficit practice, which might indicate to some that teachers themselves are incompetent in the LoLT (Martin, 2005; Probyn, 2009, 2015). Another reason might be teachers' concerns regarding students' inability to engage in proper scientific discourse in the LoLT if their primary language is used in instruction (Setati, Adler, Reed, Bapoo, 2002). Nevertheless, from a socioconstructivist perspective, students learn by building on their prior knowledge and using the resources they have. Their home language which develops in their social and cultural context constitutes the base of their thinking, learning, and identity (Cummins, 2007, 2012; García, 2008). Prohibiting multilingual learners (MLLs) from accessing their home language in instructional settings may hamper their ability to build upon their prior knowledge. Therefore, in response to these concerns, Annamalai (2017) recommends that teachers 'relax' and allow students to use their home language without feeling guilty as this strategy enhances students' understanding and the quality of their work without affecting their use of specific genres.

The issue of language in science teaching and learning has become of interest in Lebanon very recently. Similar to the findings in other Arab countries, the language of instruction is among the major challenges to science education in Lebanon (Amin, 2009, BouJaoude & Abd-El-Khalick, 2004; BouJaoude, Abd-El-Khalick, El-Hage, 2009). What exacerbates the situation in Lebanon and the Arab world is the existence of various dialects of Arabic along with the Modern Standard Arabic (MSA) (Ferguson, 1959). The home language of the Lebanese students is the Lebanese dialect (LD) rather than the MSA and science is taught in a foreign language (French or English). This fact adds to the complexity of the issue of multilingualism in Lebanese schools and underscores multilingualism as an area of research, especially since a very limited number of studies on the use of home language in science instruction have been conducted in Lebanon (e.g., Amin & Badreddine, 2020; Salloum & BouJaoude, 2017, 2020).

Therefore, given the criticality of the issue in Lebanon including the influence of language on students' understanding of science and academic achievement, it is important to explore how MLLs can be supported in the science classroom.

Statement of the Problem

Science education is thought to be a challenging and linguistically demanding school subject, particularly for MLLs who struggle to learn the language of instruction and science content simultaneously. This issue remains under-researched in the Arab world despite its significant implications.

Recent reviews suggest that the language of instruction is one of the major challenges to science education in the Arab world and student underachievement in international comparative assessments, such as TIMSS (BouJaoude & El-Hage, 2016). This issue becomes more crucial in a multilingual and multicultural country like Lebanon where language in education policies dictate that science be taught in a foreign language while the national language itself is of a heteroglossic nature.

Hence, this study aims to address a gap within the existing literature lying at the intersection of the Community of Inquiry (CoI) and TL. The primary purpose of the study is to explore the quality of science teaching and learning in a multilingual classroom in Lebanon using the CoI framework as an analytical lens. Of particular interest to the study is to understand the potential role TL plays in supporting students' learning in a middle school science classroom by manifesting CP, SP, and TP. Ultimately, the integration of CoI and TL frameworks may help identify the functions of home language when integrated into science instruction.

Research Questions

The main purpose of this study is to explore the roles played by TL in the face-to-face learning experiences of multilingual students in a 7th-grade physics classroom. Specifically, the study aims to answer the following research questions:

1. What is the quality of the learning environment in a Lebanese multilingual physics classroom, as understood from the perspective of the community of inquiry framework?
2. What roles does translanguaging play in enacting the cognitive, social, and teaching presences in a Lebanese multilingual physics classroom?
3. What are the teacher's and learners' perceptions of the three types of presence characterized through the lens of the CoI survey?
4. What are the teacher's and students' attitudes toward the approach to language use in the studied multilingual physics classroom as well as their attitudes toward the use of translanguaging in instruction?

Significance of the Study

The findings from this study contribute to the literature on multilingual science education. Adopting the CoI framework is of significance since it facilitates the identification of the functions of TL in enacting CP, SP, and TP in a 7th grade multilingual physics classroom. The study extends the application of the CoI framework to a K-12 face-to-face setting in Lebanon. Most of the research on the CoI framework is conducted in online higher education. A limited number of studies analyzed learning environments using the CoI framework in a blended setting in K-12 and higher education. To the best of our knowledge, at the time of conducting this research, no study had explored the use of the CoI framework in a K-12 face-to-face multilingual classroom. Another methodological significance is the use of a mixed methods approach for exploring the quality of the learning environment from the lens of the CoI framework as well as exploring the functions of home language in a multilingual science classroom. While most of the existing studies on CoI either use the CoI framework to analyze the discourse of teaching and learning or the CoI survey, the latter sometimes followed by interviews, this study used both approaches to analyze the learning environment in the studied classroom. The use of these three data collection tools (CoI framework, CoI survey, and interviews) allowed the triangulation of data; thus, exploring possible alignment between the identified patterns using the framework, the survey responses, and the interview responses.

Furthermore, the finding from this study contribute to the literature on TL focused on stakeholders' (teacher and students) attitudes toward TL. There is a dearth of research exploring stakeholders' attitudes towards TL, especially in the Arab world. Of paramount significance is the exploration of students' attitudes toward TL since students are the main recipients and interactors with TL pedagogy (Fang & Liu, 2020).

Concerning practice, the integration of the CoI framework with TL is an innovative approach to understand and address the challenges encountered in multilingual settings, be they online, face-to-face, or blended. On the one hand, this study raises teachers' awareness of the notion of being present in a learning environment and how this presence can be leveraged using CoI-anchored strategies; thus, promoting critical thinking, social interaction, and collaboration in science classrooms. On the other hand, the study provides insights into how the strategic integration of TL practices within the CoI framework can enhance the learning experiences of multilingual students. Further, educators and curriculum designers could gain insights into effective strategies for utilizing students' full cultural and linguistic repertoires in science education, leading to more inclusive and engaging learning environments.

Finally, this study could inform policy change and curricular reform to cater to the needs of multilingual learners in Lebanon. The findings underscore the invaluable contribution of TL to students’ cognitive and social engagement, suggesting broadening the language-in-education policies to encompass students’ full linguistic repertoires. Additionally, the findings could inform teacher education and professional development programs, advocating for the inclusion of training and support mechanisms that prepare new and in-service teachers to effectively teach multilingual learners, considering their home language(s), discourse, and ways of knowing as valuable resources.

CHAPTER 2

LITERATURE REVIEW

In the past several decades, there has been an increasing emphasis on scientific literacy as a major goal of science education. An essential aspect of scientific literacy is the understanding of science subject matters including the science and engineering practices (NRC, 2012). However, science is thought to be a challenging and linguistically demanding school subject (González-Howard & McNeill, 2019; Lee, Quinn, Valdés, 2013) towards which students exhibit declining interest (Murphy & Beggs, 2003) and low motivation (Braund, 2009; Sjøberg, Schreiner, 2010) to learn. This challenge is heightened particularly for students transitioning from elementary school to middle school, where science becomes more specialized. Navigating the intricacies of each of these subjects necessitates the learning and understanding of the language of science (Lemke, 1990) including the use of more specialized technical discourse. Compared to monolinguals, the challenge of science learning for multilinguals, who exhibit low proficiency in the language of learning and teaching (LoLT), is doubled as they struggle to master science concepts while learning the language of instruction. This issue has been reflected in students' underachievement in science in the United States (Thomas & Collier, 1997), Africa (Reddy et al., 2016), and the Arab world (BouJaoude & Dagher, 2009).

Hence, there is a heightened need for research that explores various ways that can potentially support multilingual learners (MLLs) in science class, particularly disadvantaged learners with low socioeconomic backgrounds. Such research discloses the need for frameworks that render possible 1) the analysis of science learning environments while simultaneously understanding how MLLs interact in science classrooms, and 2) the design of inquiry-based learning environments that support MLLs. One way to achieve this dual role is to make connections between the two widely used frameworks: the Community of Inquiry (CoI) framework and translanguaging (TL). When integrated, the CoI framework and TL could lend themselves as a mirror and a compass. As a mirror, the CoI framework reflects the dynamics of interactions manifested by the cognitive, social, and teaching presences and the diverse linguistic interactions that occur between the students, between the students and the teacher, and between the students and the content in the examined learning environment. As a compass, together CoI and TL theories can guide educators to design equitable and inclusive multilingual inquiry-based science learning environments.

While the CoI framework has been used to analyze diverse learning environments, it hasn't been used to analyze face-to-face learning environments. Additionally, while several sociocultural researchers in the world have been showing increased interest in TL in science classrooms, this area of research remains under-researched in the Arab world. Attention to the highlighted issue of language becomes more crucial in a multilingual and multicultural country like Lebanon where language-in-education policies dictate that science be taught in a foreign language while the national language itself is of heteroglossic nature.

Thereby, this study aims to address a gap within the existing literature on the intersection of the CoI and TL theories. It considers how two pedagogical theories or frameworks, CoI and TL, can be brought together to support educators and students in the face-to-face K-12 educational landscape to create linguistically inclusive science classrooms. Two main objectives of the study are: 1) to explore the quality of science teaching and learning in a middle school multilingual science classroom in Lebanon using the CoI framework as an analytical lens; and 2) to understand the potential role TL plays in supporting students' learning in the middle school science classroom by manifesting CP, SP, and TP. Ultimately, the integration of CoI and TL frameworks may help identify the functions of home language when integrated into science instruction. In addition to these two core objectives, the study explores the attitudes of stakeholders, the physics teacher, and students, toward the use of TL in physics classroom – i.e., a topic that is under-researched, particularly in the Arab world.

Along these lines, I organize my review of the literature in this chapter into four sections. The first section introduces the CoI framework as a socio-constructivist instructional framework that can be used to effectively analyze and design learning environments in K-12 online, blended, and face-to-face science classrooms. The second section introduces TL as a promising pedagogical approach that supports MLLs in K-12 science classrooms. It also includes a summary of research on the attitudes of stakeholders (teachers and students) toward the deployment of TL practices in classrooms. The third section sheds light on the potential of integrating the CoI framework and TL to understand how home language, along with the language of instruction, could leverage the cognitive, social, and teaching presences. Finally, the last section presents a summary of relevant empirical studies in the Arab world alluding the need for more studies addressing this area of research.

Community of Inquiry Framework

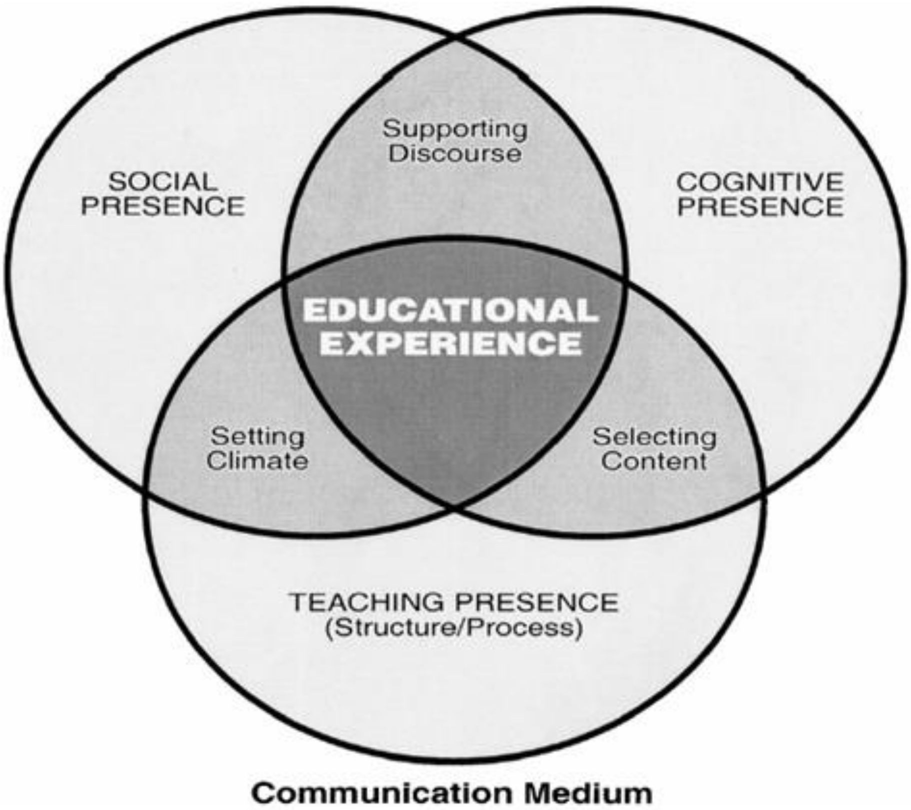
Two decades ago, the Community of Inquiry (CoI) framework was suggested as a coherent generic structure for collaborative and socio-constructive educational experiences in the online higher education landscape (Garrison et al., 1999). For clarification, I use the term ‘online’ education here to refer to synchronous or asynchronous text-based learning environments. Though the framework was first developed to describe and analyze online learning environments, Garrison (2016) asserts that the generic yet coherent structure of the framework renders it applicable in online, blended, and face-to-face educational landscapes on the one hand as well as in formal and informal learning spaces, including K-12 and university level education.

In fact, while most researchers used the framework mostly in online higher education (Akyol & Garrison, 2008; Garrison et al., 2001; Rourke et al., 1999), a few researchers adopted the framework in K-12 learning settings, both online (e.g., Annamalai, 2017; Rannastu-Avalos & Siiman, 2020) and blended ((Villanueva, 2021; Villanueva et al., 2022). Scholars have also employed the CoI framework across a range of topics including intracultural communication in Germany (Walker, 2017), foreign languages (Annamalai, 2017), business (Arbaugh & Rau, 2007), information systems (Heckman & Annabi, 2005) and science (Tan et al., 2020).

The framework is rooted in Vygotsky’s (1978) theory of social construction of knowledge and John Dewey’s (1933) practical inquiry and critical thinking model. Acknowledged in the CoI framework is the premise that learning experiences are collaborative and reflective. In such a community, learners actively construct/reconstruct their knowledge and experiences through critical analysis, questioning, and challenging each other’s assumptions. According to the CoI framework, such a meaningful learning experience occurs at the interaction of three fundamental interlocking elements: Cognitive Presence (CP), Social Presence (SP), and Teaching Presence (TP).

Figure 1

Elements of the CoI Framework



Note. From "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education", by R. Garrison, T. Anderson, and W. Archer, 1999, The *Internet and Higher Education, 2(2-3),* p. 88. 2000 Elsevier Science Inc.

Garrison (2016) defines *presence* "as a sense of identity created through purposeful and open communication" (p.70). In this sense, the concept of *presence* extends beyond its initially proposed holding environment - i.e., the online educational landscape - to blended and face-to-face learning spaces. As such, regardless of the nature of the learning environment, the presence of learners can be manifested through their active and intentional engagement in the learning environment through purposeful open communication. Figure 1 shows the tripartite structure of the CoI framework underscoring CP, SP, and TP as the three fundamental interlocking presences existing in effective learning environments. In what follows is a description of each presence type.

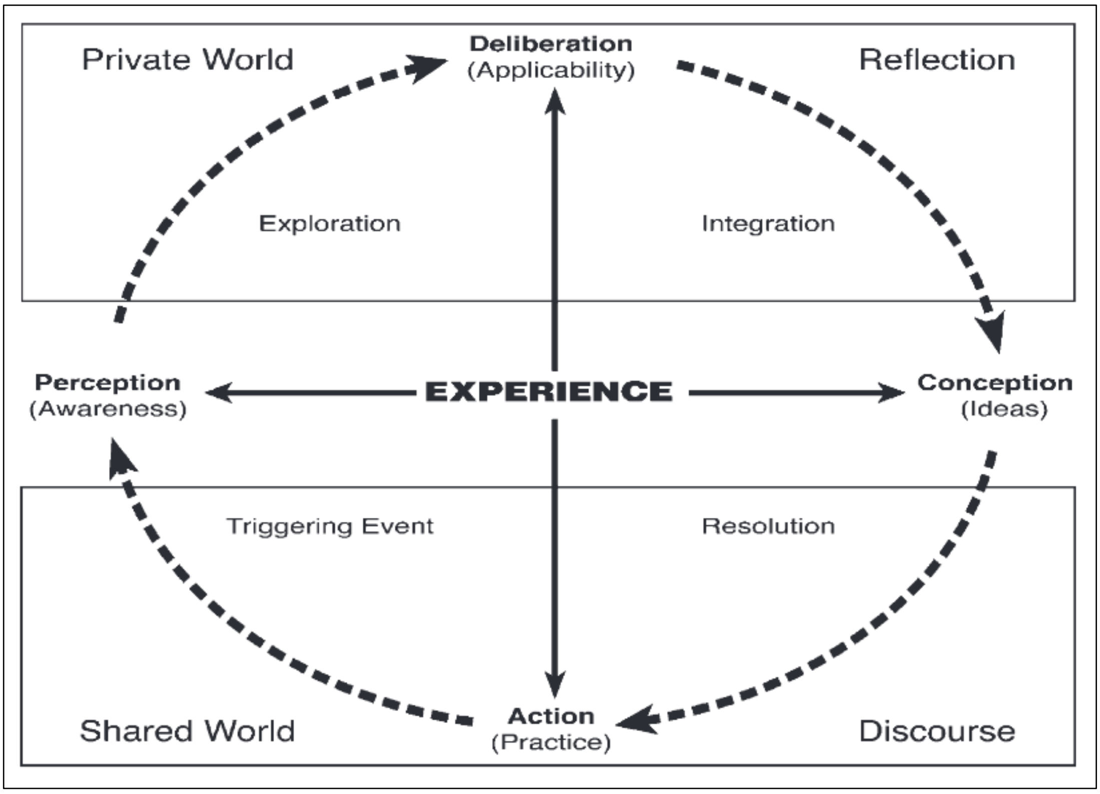
Cognitive Presence

Garrison, Anderson, and Archer (2001) assume that CP is the ultimate goal of a learning environment. Anchored in the literature of critical thinking, CP is defined as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (p. 11). To be able to assess learners' CP, Garrison et al. (2001) operationalize CP by Dewey's (1933) practical inquiry model; thus, assuming that CP is enacted throughout a four-phase process: *Triggering Event* (TE), *Exploration* (EX), *Integration* (IN), and *Resolution* (RE).

Figure 2 represents the dimensions as well as the phases (or categories) of CP (Garrison et al., 2001). The vertical axis is the "deliberation-action dimension" which represents the iterative process between thought and action. It defines the reflection and collaboration characteristics of online (and face-to-face) learning. The horizontal axis is the "perception-conception dimension" which depicts the assimilation of pieces of information and the construction of ideas and concepts. In other words, the latter dimension represents the transition from the concrete world to the abstract world. These two dimensions make up the learner's private and shared worlds. The former dimension also unifies these two worlds of inquiry as learners move between reflective thinking and practice. Furthermore, the suggested categories for CP indicators portray it as a developmental model entailing four consequential phases of practical inquiry, i.e., critical thinking. First, learners engage in a *Triggering Event* that provokes a sense of puzzlement regarding a particular experience or problem. Second, learners engage in individual and collaborative *Exploration* through which they search for information that helps them make sense of the problem. In this phase, learners tend to be inquisitive divergent thinkers. They engage in brainstorming, questioning, and exchange of knowledge as they shift between their "private world" and the "shared world", i.e., between reflection and discourse. Third, as learners transition into *Integration,* they continue to move between reflection and discourse to examine the applicability of

Figure 2

Practical Inquiry Model



Note. From *"*Critical thinking, Cognitive Presence, and Computer Conferencing in Distance Education*",* by R. Garrison, T. Anderson, and W. Archer, 2001, American *Journal of Distance Education, 15*(1), p. 9. 2007 Elsevier Inc.

integrating the acquired information into coherent ideas or concepts. The transition to this phase is challenging for the learners as they may feel more comfortable staying in the *Exploration* phase. This transition, per se, requires effective TP in which the teacher examines learners' ideas and scaffolds them to engage in higher-order thinking. In the fourth phase, Resolution, learners apply and test the ideas constructed in the previous phases. The generated results from the application of the constructed solutions determine whether the cycle of practical inquiry regarding the problem under study requires re-iteration.

CP is perceived as the most challenging type of presence in terms of study and development in online teaching and learning settings (Garrison & Cleveland-Innes, 2005). For instance, several researchers have reported that learners may not move beyond the *Exploration* phase, i.e., their interactions are limited to lower order thinking skills (Luebeck & Bice, 2005; Murphy, 2004; Shea, Hayes, Vickers, 2010). One reason for this finding might be that the two phases, *Integration* and *Resolution* demand more time for reflection than does the *Exploration* phase (Moore, 2003). In corroboration with Moore who blamed teachers for not being directive in their assignment of tasks, Bangert (2008) and Garrison and Arbaugh (2007) also associated stalling at the lower phases of inquiry with ineffective TP.

Social Presence

As essential as CP in a community of inquiry is SP. It is actually the most studied among the three types of presence in online and face-to-face learning settings (Gunawardena & Zittle, 1997, Richardson & Swan, 2003). Garrison (2009) defines SP as the "ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities" (p. 325). SP is believed to facilitate the process of critical thinking and practical inquiry carried on by the community; thus, supporting the development of CP. Additionally, SP is assumed to be a mediating variable between the two other presences (Garrison, Cleveland-Innes, Fung, 2010).

SP actions can be grouped into three categories, *Affective Expression*, *Open Communication*, and *Group Cohesion* (Garrison, 2017; Rourke et al., 1999). Through *Open Communication*, learners ask questions, refer to each other's comments, continue a thread of discussion, compliment, and express agreement. *Affective Expression* includes expressing emotions, being humorous, and sharing details of life outside the class. The third category of SP, *Group Cohesion*, or *Cohesive Responses* is recognized when learners' salutations (e.g., "hi all"), communicate for purely social purposes (e.g., "beautiful weather here today"), address each other by name, and address the group using inclusive pronouns.

Teaching Presence

The third component of CoI is TP whose key role is to guide and bring together the two other presences. Effective TP helps learners construct personal meanings and achieve educational outcomes through guided interaction and communication (D. R. Garrison & Arbaugh, 2007). To ensure a successful online learning environment, a teacher is expected to fulfil three main responsibilities: *Instructional Design and Organization*, *Facilitating Discourse*, and *Direct Instruction* (Anderson, Rourke, et al., 2001). Although the description provided emphasizes TP as the role of the instructor, Garrison (2017) asserts that this type of presence is referred to as the *Teaching* Presence rather than the *Teacher* Presence because it is not a teacher-restricted role. It can extend to students playing the role of the teacher.

TP starts before the teaching/learning session where the teacher (or student) plans for the session and prepares relevant content and activities. However, lesson preparation is probably more extensive and time-consuming in an online setting than in a traditional setting. In the absence of a face-to-face environment, Anderson, and colleagues (2001) suppose that a teacher is obliged to thoroughly plan the process of instruction, the structure of the lesson, evaluation, and interactions in the online educational experience. The teacher is also expected to explicitly inform the students of the goals and design of the lesson. As for the second responsibility, *Facilitating Discourse*, the teacher is expected to ensure effective and efficient use of time while facilitating discussions to promote students' interest, motivation, and participation. *Facilitating Discourse* also includes setting the climate for learning, prompting discussion, and assessing the efficacy of the learning process. Finally, as part of *Direct Instruction*, the teacher is expected to present content, pose questions, focus discussions, diagnose misconceptions, confirm understanding through assessment and explanatory feedback, and respond to the learners' technical concerns.

Methodological Approaches to Implementing the CoI Framework

There are two major methodological approaches for studying a learning environment using the CoI framework. The first is an exploratory qualitative approach which Garrison et al. (1999) have suggested since the early inception of the framework more than two decades ago. Meanwhile, the second approach is quantitative; it entails using a survey (see APPENDIX A) developed by Arbaugh et al. (2008) to overcome the limitations of the qualitative approach and to study larger-scale learning environments.

Exploratory Qualitative Approach to Implementing the CoI Framework. In addition to the descriptions of the three presence types, Garrison et al. (1999) propose a methodological approach for analyzing the learning experiences from the perspective of CoI framework. They suggest categories and indicators for coding the transcripts of texts shared by the members of the community of learners and consequently identify their level of realization of each presence (Table 1). This method, known as transcript coding or content analysis is generally an exploratory qualitative approach (Garrison, Cleveland-Innes, Koole, Kappelman, 2006). Yet, it can be followed by quantitatively assigned frequencies to the category classifications of each presence; thus, providing statistical insights into the transcribed discourse. In CoI content analysis, Garrison et al. (1999, 2001) and Rooke et al. (2000) assume that various units of analysis (e.g., theme, paragraph, message, sentence, phrase, illocutionary act) can be chosen depending on the purpose of the study. Yet, they emphasize the message as a more practical unit of analysis for it can be objectively recognized as its length is determined by the speaker, not the researcher.

Most of the studies adopting the exploratory approach to implementing the CoI framework study one element of the tripartite framework (e.g., Anderson et al., 2001, Rourke et al., 1999; Shea et al., 2003, Shea et al., 2006, Swan and Shih, 2005). Following is a summary of the findings of some empirical research studies adopting the described approach to implementing the CoI framework in online and blended learning settings. It is worth noting that to the best of my knowledge at the time of the study, literature lacked an empirical study implementing the CoI framework in a fully face-to-face setting.

Table 1

Commuinty of Inquiry Categories and Indicators

Elements	**Categories**	**Indicators (examples only)**
Cognitive Presence	Triggering event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Apply new ideas
Social Presence	Personal/Affective	Self-projection/expressing emotions
	Open Communication	Learning climate/risk-free expression
	Group Cohesion	Group identity/collaboration
Teaching Presence	Design & Organization	Setting curriculum & methods
	Facilitating discourse	Shaping constructive exchange
	Direct instruction	Focusing and resolving issues

Note. Adapted from *E-Learning in the 21st Century: A Community of Inquiry Framework for Research and Practice* (28), by D. R. Garrison, 2017, Taylor & Francis Group, 2017.

Content Analysis: Implementation of the CoI Framework in Online Learning Settings. The following paragraphs provide a summary of some studies that adopted the content analysis approach to implementing the CoI framework in online learning settings.

Exploring CP. Most of the studies on CoI are conducted in online university-level contexts. For instance, Garrison et al. (2001) analyzed the CP of graduate students over one week of an asynchronous computer-based conference course. The messages shared by the participants were distributed as follows: 8% *Triggering Event,* 42% *Exploration,* 13% *Integration*, and only 4% *Resolution*. The researchers assumed that having a small number of messages corresponding to *Triggering Event* was expected since the teacher well introduced and explained the posed problem. They also expected most of the messages to be explorative since *Exploration* is the phase where students brainstorm and share relevant information they have. However, the low occurrence of *Integration* and *Resolution* suggests that on the one hand engaging in higher-order thinking skills- i.e., reflection - requires more time. On the other hand, students might be hesitant to share alternative solutions and applications. Relatively similar results were reported by Kovanović et al. (2016) who analyzed students' posts in a fully online master's level course about software engineering. The researchers assumed that, in addition to the mentioned limitations, not explicitly asking students to move to *Resolution* could be a cogent reason for stalling in the lower phases of inquiry.

Exploring SP. Joksimovic, Gaševic, Kovanovic, Riecke and Hatala (2015) investigated the relationship between the indicators of SP and academic achievement. The participants were 81 graduate students enrolled in an asynchronous online computer science course. They were divided into two main groups. Both groups were asked to constructively contribute to the discussions on peers' presentations. The major difference between the two groups was that only the treatment group received external scaffolds from the teacher regarding the quality of the expected posts in a constructive discussion. The final grade of the course was based on five assignments rather than a final examination. While the number of SP posts for both groups was equal, the quality of the posts of the treatment group exhibited a more effective SP. Quantitative analysis of the coded posts revealed that particular indicators of SP (e.g., continuing a thread of discussion) were significant predictors of academic achievement. Moreover, as claimed by Maurino (2007) and Polhemus, Shih, and Swan, (2001), this study suggests that SP positively impacted students' cognition. And since the learning outcomes of the course were aligned with the online graded discussions, Joksimović et al., (2015) argue that CP is not only associated with achievement but is also a more dominant indicator of achievement than SP. Further, in accordance with the findings of other studies (e.g., Garrison & Cleveland-Innes, 2005), Joksimovic et al. (2015) suggest that “social presence is facilitated by teaching presence while both teaching presence and social presence facilitate cognitive presence” (p.650). Hence, TP can be regarded as the glue that binds the other components of CoI (Garrison & Anderson, 2003).

Exploring TP. Anderson et al. (2001) examined the occurrence of the three categories of TP in an online graduate level health course and an online graduate level education course. Using the message as the unit of analysis, the researchers analyzed the instructor’s posts in each course. In most of the posts, they found indicators of more than one category of TP. Although the education instructor posted a considerably lower number of messages (32) compared to the health instructor (139) his posts mainly included indicators of two or three categories of TP. Meanwhile, the health instructor’s posts predominantly entailed indicators of just one category. However, both instructors engaged mostly in *Direct Instruction* followed by *Facilitating Discourse* and finally *Instructional Design.* Nevertheless, the education course instructor used much fewer *Direct Instruction* posts (28 posts) than the health course instructor (107 posts). The disparity in the number of *Direct Instruction* posts stems from the fact that the education course instructor distributed teaching roles to students. Anderson et al. (2001) conclude that the content analysis approach to CoI at the message level is a reliable and easy-to-use tool to describe and understand disparities between the teaching styles of different teachers and across different disciplines.

In a more recent study along these lines, Wang and Liu (2019) investigated the influence of TP on the interactions and collaborative knowledge construction of university-level students in three 12-week online courses. The researchers reported that the students' interactions and knowledge construction differed across the courses but a major reason for this difference was the way the instructor facilitated online discussions. Indicators of *Design and Organization* and *Facilitating Discourse* indicators were found to positively affect students' interactions, evoke rich interactions and discussions, and thus open up opportunities for knowledge co-construction. On the other hand, high levels of occurrence of *Direct Instruction* were thought to impede students' interactions and knowledge construction. Wang and Liu suggested using less *Direct Instruction* and hence more student-centered approaches to learning to nurture students' interactions and knowledge co-construction. Further, in agreement with Garrison and colleagues (Garrison, 2017; Garrison & Arbaugh, 2007; Garrison et al., 2010), Wang and Liu shed light on the importance of providing students with appropriate time and space for them to argue, apply, test, and reflect on their solutions. Such student-centered approaches to enacting TP open up opportunities for students to move beyond the lower phases of practical inquiry to *Integration* and *Resolution*.

Exploring the tripartite structure of CoI. While the above studies used content analysis to mainly explore one presence type in online learning environments, the following research studies explore all three elements of the CoI framework.

Akyol and Garrison (2008) examined the progressive development of the three presences altogether across time. The researchers analyzed the posts of 16 graduate students in a course about blended learning though the course was delivered completely online at the University of Calgary. In this course, students moderated online discussions, thus enacting TP. Focusing on students' interactions and how their presences change over time, the researchers deleted the instructor's messages. The researchers collected data across 9 weeks in the fall of 2007. They divided the transcripts into three periods, each period corresponding to a 3-week period of the course. Analysis of the transcripts revealed that at the beginning of the course, SP dominated followed by CP, and lastly TP. Concerning SP, students started with low *Group Cohesion* and higher levels of *Affective Expression* and *Open Communication*. However, as *Group Cohesion* began to increase, *Affective Expression* (e.g., self-disclosure) declined suggesting that “collaborative activities increase students’ sense of belongingness to the group which le[a]d[s] them from an individual perspective to a group perspective” (p. 16). Zooming into CP, the researcher found no significant change in the instances of occurrence of the four phases of practical inquiry. This could be a result of the similarity between the topics and the tasks students performed each week. Interestingly, students engaged in *Integration* more than *Exploration*. The number of messages conveying *Integration* also increased in the last period of the course while that of *Exploration* and *Resolution* decreased. Akyol and Garrison assume that the increase in the level of *Integration* could be a consequence of students’ increased use of diverse resources. This observation could also be associated with the course design; students were consistently engaged in tasks requiring them to connect ideas as part of their discussions and explanations of the topics. Similar to other studies (D. R. Garrison et al., 2001; Meyer, 2003), the researchers reported a low level of engagement in the *Resolution* phase. This could be attributed, the researchers suggest, to the short duration of the course and the nature of tasks; students were not asked to implement their projects and share their results. Lastly, students' enactment of TP significantly changed over time. Students tended to engage the least in *Design and Organization* which makes sense given that relevant actions typically occur prior to the session. It is worth noting that students engaged more in *Facilitating Discourse* at the beginning of the course suggesting that facilitators needed to encourage other students to participate; however, when students became familiar with each other and the course design they needed less prompting to participate. Meanwhile, as *Facilitating Discourse* decreased, students engaged more steeply in *Direct Instruction* implying that with time students gained more experience and confidence in directing instruction. In conclusion, the analysis of the developmental progression of the three presences implies that the three elements of the CoI framework are distinct yet interlocking and dynamic. The researchers also suggest that while SP was not found as essential for students' learning as TP and CP in the graduate course, SP might be more contributive to students' learning in K-12 and informal learning settings.

In a recent qualitative study, Rannastu-Avalos and Siiman, (2020) explored the challenges facing science K-12 science teachers in Estonia during online collaborative learning at the time of the COVID-19 pandemic using the CoI framework. Instead of conducting content analysis of class discussion transcripts, the researchers interviewed five middle school science teachers who were chosen using the convenience sampling method. The interviews were video-recorded and transcribed. After coding the transcripts in MAXQDA 2020 and thematically analyzing them, the researchers were able to identify several challenges for distance learning as well as online collaboration. These challenges, as asserted by the researchers, imply that the tools and pedagogical methods used by the teachers were not very effective in creating a learning environment that generates SP and supports collaborative learning. Therefore, further research is needed to investigate the best practices that support online collaborative learning amid the three types of presence.

In a less formal learning environment, Angelaina and Jimoyiannis (2012) explored the effectiveness of blogs as a collaborative project-based learning environment. They engaged K- 12 students in investigating the topic of acid rain through blogging during ICT periods over 10 weeks. Students were told that their participation is graded as a part of the ICT course requirements. They were allowed to blog both in ICT sessions at school and from home. They were also encouraged to discuss and reflect on any theme or other topic that appears in the class blog. After 10 weeks, all the content of the blog was analyzed using the CoI framework indicators. Research findings indicated that students were engaged in the integration of ideas and construction of meaning in the community of inquiry of the class blog. Moreover, they exhibited interest and social and affective support for each other. The three components of online meaningful learning were afforded by the blog and teacher's directions. Therefore, the researchers concluded that project-based blogs can promote online learning of a community of inquiry. Additionally, the findings of the study also indicate that the active participation of students is vital for actualizing CP.

Content Analysis: Implementing the CoI Framework in Blended Learning Settings. A fewer number of CoI studies were conducted in blended learning settings compared to online settings. Described here are two studies to illustrate how the CoI framework has been employed in blended learning settings.

In the first few years of the development of CoI, Meyer (2003) explored the CP of graduate students in a blended learning environment. Meyer compared the extent to which CP is enacted between face-to-face and online (threaded discussions) learning experiences of students., Students were also asked to assess their learning experience - i.e., compare face-to-face and threaded discussions to identify similarities and/or differences and preferences at the end of the course. Students' threaded discussions were also analyzed using the CoI coding scheme. Students' responses unveiled a feeling of being constrained in the face-to-face setting in the sense that they didn't have enough time to reflect on the responses of their colleagues. Consequently, they preferred threaded discussions for such discussion format provide them with the time needed to reflect on their colleagues' responses before they synthesize their own responses. In accordance with other studies (e.g., Garrison et al., 2001), the analysis of the threaded discussions revealed that students engaged the most in *Exploration* and the least in *Resolution*. However, the low level of engagement in higher-order thinking skills in the threaded discussions despite having the time to reflect is a conundrum that might be associated with several factors such as "the complexity or difficulty of issues raised, a lack of student skill or information to propose or test a resolution to the problem at hand, or a missed opportunity on the part of faculty who could have pressed for a resolution to questions being raised by the discussion" (p.63).

In another study, Villanueva (2021), for instance, examined how CP can be enacted in K-12 blended learning classes in the Philippines. The participating students were from three classes (one 7^{th} grade and two 10^{th} grade classes) corresponding to three public schools and five teachers. Yet, the three classes were treated as one group. Classes we observed and transcripts were collected and analyzed. Notably, Villanueva assumed that the CoI framework needed to be adapted to the K-12 Philippines context. In this particular study, Villanueva adapted the CP coding scheme to include "Self- and Coregulation and Reflection" (p. 32) within the CoI framework as categories of CP. Content analysis of the face-to-face and online class discussion transcripts revealed that students' interactions were associated the most with *Exploration* in the form of *information exchange* and the least with *Integration* and *Resolution*. This could be attributed to course design and the style of teacher facilitation, which in this case nurtured critical thinking, reflection, and student agency.

The CoI Survey. Highlighting the difficulties and limitations of the transcript coding method, Arbaugh et al. (2008) developed the CoI survey (see APPENDIX A) assuming it is, on the one hand, more efficient to use when examining learning environments in large-scale studies, and on the other hand, a more valid and reliable quantitative approach to assessing the three types of presence. Early validations of the survey (Arbaugh et al., 2008; Swan et al., 2008) confirmed the reliability and validity of CP, SP, and TP using a sample of 287 students across four institutions located in the United States and Canada with Keyzer-Meyer-Olkin (KMO) measure of sample adequacy of 0.96 and measure of internal consistency (Cronbach's α) above 0.90 for each presence.

The CoI survey consists of 34 question items targeting the three types of presence. The first 13 items measure TP. Items 14-22 measure SP and items 23-34 measure CP. The three presences are measured using a Likert scale ranging from 0 (Strongly Disagree) to 4 (Strongly Agree) though many studies adopting the CoI survey have used the scale ranging from 1=Strongly Disagree to 5=Strongly Agree.

In a systematic review, Stenbom (2018) noted that the CoI survey has been used for various purposes: "to explore a single learning environment, to examine differences using the CoI survey, to observe relationships among the different elements of CoI and their relationships with other data, and to address the reliability and/or validity of data using the CoI survey" (p.25). Some of the studies consider only one or two elements of the CoI while the majority explore the three elements altogether.

In the same study mentioned under content analysis in blended settings, Villanueva (2021) had students respond to the CP items of the CoI survey. Students had positive perceptions of CP in the blended learning environment. However, contrary to content analysis findings, students had the highest rating for *Integration* items and a very high rating for *Resolution* items as well.

Quite similar CoI survey results were reported by Nagel and Kotzé (2010) who examined students' perceptions of the three presences and their categories after half a year of a course at the department of Economics and Management Sciences. On a scale from 1 (Strongly Disagree) to 5 (Strongly Agree), Nagel and Kotzé found that TP was the strongest presence in the online learning environment (4.31) with *Design and Organization* with the highest rated category of TP. Students also had relatively positive perceptions of CP (4.00) and average perceptions of SP (3.52). Under CP, students had the highest ratings for *Integration* and *Resolution*. Nagel and Kotzé associated the unexpected high perception of CP with effective course design. Students were asked to peer review each other's work which compelled them to negotiate and engage actively in discussions. The fact that peer review was double blinded created a safe environment for students to share their opinions and reflections. These findings align with Garrison et al.'s (2010) emphasis on TP as a key to promoting the two other presences particularly CP, particularly through design and leadership.

While the CoI framework has the potential to guide the evaluation, analysis, and design of inquiry-based learning environments for K-12, university level, and informal educational landscapes, it falls short in addressing the needs of multilingual learners who encounter the challenge of learning both, science content and the language of instruction simultaneously.

Translanguaging

An indispensable tool that mediates the actualization of the three types of presence in CoI is language; a formidable cognitive tool that cannot be ignored (Vygotsky, 1986). The issue of language becomes more critical when speaking about bilinguals or multilinguals who are learning science (and other school subjects) in a non-native language. Declining children their right to use their home language at school has been seen as an act of colonialism (Freire, 1968). While switching the language of instruction completely to the learners' first language might seem almost impossible at present, especially in multicultural and multilingual classrooms, several scholars suggest the adoption of translanguaging (TL) as an intended pedagogical strategy.

In bilingual teacher education circles, TL has been used synonymously with codeswitching (CS) (Gort, 2012, Palmer & Martínez, 2013; Poza, 2017; Sayer, 2013; Li, 2017 as cited by Faltis, 2020). While there exists a controversy in the literature as to whether use the term 'codeswitching' or 'translanguaging' (Faltis, 2020; Goodman & Tastanbek, 2020), "[t]he commonalities, in terms of what each contributes to promoting bi[/multi]lingualism, far outweigh their theoretical differences" (Faltis, 2020, p. 57). Several researchers have called for a shift to the recent term. For instance, Goodman and Tastanbek (2020) suggest a framework to guide the conceptual shift from CS to TL emphasizing that CS and TL stem from different theoretical commitments. Faltis (2020) also compared pedagogical TL and CS particularly the *New Concurrent Approach (NCA)* to CS (for more details about the NCA to CS see Faltis 1990, 1996 and Jacobson, 1981). In the comparison, Faltis asserts that both TL and CS are decolonial pedagogies and political acts against dominant language ideologies. However, while the NCA to CS requires "bilingual teachers to pay attention to cues and time in language, to ensure students have opportunities to engage in extended discourse about content in academic contexts .. [and ensure] equal distribution of named languages" (p. 56), TL pedagogy requires "bilingual teachers to shift languages in response to language and content learning needs, and to develop students' bilingual identities [with] no attention to time in language" (p.56).

In this study, the term 'translanguaging' is used since TL is considered a broader and holistic framework that entails the linguistic practice of CS (Faltis, 2020; García, 2009; Macaro, 2009). Additionally, although TL scholars emphasize that a MLL has a unitary linguistic repertoire with no boundaries between named languages, they acknowledge that MLLs "can communicate only with features of their repertoire, those that respond to named languages" (García & Kleyn, 2016, p. 16). Hence, while rejecting the assumption that languages are rigid separate entities, TL still offers a room for naming languages as a methodological tool for strategic planning of languaging practices (Goodman and Tastanbek, 2020). Further, the participants in this study used the Lebanese dialect and English in addition to some Modern Standard Arabic and French that existed in their linguistic repertoire. They also engaged in multimodal interaction that included reading texts and figures, social conversing, writing science genres and informal texts – i.e., notes-, drawing figures, trans-registering, using various resources (e.g., textbooks, board, laptop, copybooks, voltmeter, lamps, batteries), and gesturing though the analysis in this study excluded the two latter modalities focusing on the languaging practices spoken, read, written, and drawn.

This section offers a summary of the origin of TL as a theory and pedagogical approach, its purposes, functions, and application in K-12 science classrooms.

Origins of Translanguaging

The origins of the term "translanguaging" can be traced back to the education system in Wales in the 1980s. Historically, the Welsh language was endangered by the sociopolitical struggle with the dominant and more prestigious language, English. Though Welsh was used to some extent along with English in Welsh schools, the two languages were strictly separated by class, time, or day. To revitalize the primary language of the country and "develop balanced and confident bilingual pupils" (Williams, 2002, p. 47), some educators strategically used the two languages, English and Welsh, in the same literacy lessons in bilingual classes. Cen Williams, a Welsh educationist, and researcher named this process 'trawsieithu'. Under trawsietihu, Welsh and English are seen as separate languages; students receive information (e.g., by listening) in one language (i.e., the input language), process and understand the information, and then respond (e.g., by writing) in the other language (i.e., the output language). The need to engage in meaning-making, assimilation, and accommodation of the knowledge along with language switching between modes led Williams to consider trawsieithu a cognitive process that goes beyond mere translation. In this sense, the trawsieithu approach in Wales was found supportive of bilingual students' understanding of content knowledge in addition to the development of the language they are less competent in. The success of the approach led to its transfer into the United States and the world.

Colin Baker, a close colleague of Cen Williams, is accredited for translating the term 'trawsieithu' into English first as 'translinguifying' and then as 'translanguaging' (Lewis et al., 2012). The term became universal after Baker (2001) publicized it in the third edition of his book, *Foundations of Bilingual Education and Bilingualism*. Baker

(2011) defines TL as “the process of making meaning, shaping experiences, gaining understanding and knowledge through the [dynamic and fluid] use of two [or more] languages” (p. 288). However, while Williams conceived TL as a cognitive process, Baker (2011) assumed that it rather fits into the sociocultural theory of learning for several reasons. First, language is a sociocultural tool (Vygotsky, 1978) that mediates one’s thinking and interactions. Second, the languages students have been interdependent, and this interdependency enables them to transfer knowledge across languages. Third, knowledge transfer across languages helps students extend their previous knowledge (which might be in their home language) into their zone of proximal development. Another subtle difference between Williams’s and Baker’s views of TL lies in the role of the teacher in the bilingual classroom. Williams (2003) focuses on students’ role, how they use their languages and what this use affords them, assuming that TL is more about what students are doing rather than what the teacher can do. Meanwhile, in addition to students’ practice of translanguaging, Baker (2011) also emphasizes the vital role the teacher can play in the bilingual classroom. “[T]he teacher", he contends, ‘‘can allow a student to use both languages, but in a planned, developmental and strategic manner, to maximize a student’s linguistic and cognitive capability, and to reflect that language is sociocultural both in content and process’’ (p. 290).

After publicizing the term, research on TL increased significantly in the last two decades and scholars had various conceptualizations of the construct. A seemingly popular conceptualization of TL, that is adopted in this study, is that of García and colleagues (e.g. García, 2009; García et al., 2017; García & Wei, 2014) who undergird their view of TL with the belief that bi/multilingualism is the norm, bi/multilingualism is not additive, and languages are not separate entities. García and Wei (2014), for instance, define TL as "an approach to the use of language, bilingualism, and the education of bilinguals that considers the language practices of bilinguals not as two autonomous language systems, as has been traditionally the case, but as one linguistic repertoire with features that have been societally constructed as belonging to two separate languages" (p. 2). This view of TL disclaims the existence of psycholinguistic named languages yet acknowledges the existence of socially and politically constructed named languages (Otheguy et al, 2019). Further, it assumes that the full linguistic repertoire of MLLs is always functioning and MLLs actively choose or suppress features from their linguistic repertoire in response to the communicative context (García & Kleifgen, 2018).

In the educational landscape, García and colleagues advocate for intentionally taking up TL as a pedagogical practice with a profound transformative potential. For instance, TL is believed to empower learners by giving them back their voices which were suppressed by monoglossic ideologies (García & Wei, 2014). As such, TL is also believed to transform the cognitive and social structures in education as it disrupts the system-entrenched hierarchy of languages (García & Wei, 2014). In this sense, Wei (2011) contends that TL serves as a means to establish a space for MLLs to bring "together different dimensions of their personal history, experience, attitudes and beliefs into one meaningful practice" (p.177). In conclusion, under this view, TL is holistically viewed not only as "a way to scaffold instruction, [and] to make sense of learning and language" but also as a "part of the metadiscursive regimes that students in the twenty-first century must perform, part of a broad linguistic repertoire that includes, at times, the ability to function in the standardized academic English language" (García, 2011, p.147).

Further, although TL research has mostly focused on MLLs' linguistic resources, TL per se goes beyond the linguistic modes of communication (speaking, reading, writing). Several researchers (e.g., Blackledge & Creese, 2017; García & Li Wei 2014; Hua, Li, Jankowicz-Pytel, 2019; Li, 2018; Ortega 2017) argue that TL encompasses both, linguistic and non-linguistic modes of communication (e.g., gesturing, drawing, performing actions, etc.). However, this study focuses only on the linguistic repertoires of learners. Analytically, this study adopts the analytical definition of TL offered by Ryu (2019) as the "incidents in which individuals engage (i.e. speak, write, and read) in multilingual texts (e.g. written and oral texts, symbols, images, and discipline-specific charts and diagrams) simultaneously or consecutively within a temporal and/or spatial proximity" (p. 1309).

Purposes of Translanguaging

García et al. (2017) contend that TL has four major purposes.

First, TL creates equitable opportunities for learners to engage with complex materials, such as discipline-specific texts and topics. Offering MLLs oversimplified versions of complex texts limits their chances to productively wrestle with complex texts and topics they may encounter outside the classroom or in other higher classes. However, integrating TL in instruction helps create a *bilingual (or multilingual) zone of proximal development* (Moll, 2013) in which learners' home languages could mediate and extend their learning, sense making, and performance while navigating academic tasks. One way teachers could support MLLs' engagement with complex texts, García et al. (2017) argue, could be through creating language groups. In such groups, MLLs are provided with opportunities to develop learning interpersonally as they talk about the text with individuals whose linguistic repertoires overlap with their own. They also get to develop learning interpersonally as they use all their linguistic resources, including their home language to make sense of texts and topics in their private world.

Second, TL opens up opportunities for learners to develop and engage in academic translingual practices. It helps learners cultivate metalinguistic awareness as they develop what García calls *translanguaging hooks*. For instance, when learning a new language - i.e., academic language - MLLs can use TL to creatively play with language. They can collaboratively connect and compare the lexical, syntactic, and discourse features of their home language and the features of the new language. As such, TL can “demystify what some call academic language, showing students that using the highly valued language practices for academic purposes is actually just adding another set of language features and practices to their growing repertoires” (p.37).

Third, TL is supposed to create a social space for learners to enact their bilingualism /multilingualism and multiple ways of knowing. In the TL classroom, as García et al. (2017) assert, bi/multilingualism is the norm and linguistic practices of learners are valued. Such a norm shall disrupt the rigid hierarchy of languages. Realizing that languages are not neutral systems, MLLs develop *critical metalinguistic awareness* and become more aware of their language choices. In this sense, the TL classroom is thought to create inclusive spaces that embraces the expression of diverse ways of knowing and being. One way to achieve this purpose, for example, is to read and discuss stories from the MLLs’ cultures and histories utilizing all LLs’ linguistic resources. The discussion of such stories could create hooks across languages, cultures, and histories thus making MLLs feel recognized in academic spaces.

Lastly, the fourth purpose of TL according to García et al. (2017) is to support the expression of learners' bilingual/multilingual identities and socioemotional development. MLLs who are not native-like proficient in the language of instruction might feel alienated in the academic discourse. Nevertheless, in such classrooms, TL can be an act of social justice giving voice to MLLs. By creating an inclusive social space where MLLs see their linguistic practices "as a part of a whole, contingent, and ever-changing performance" (p.40). Thus, recognizing themselves as valued members of the community.

Achieving these purposes, García et al. (2017) argue, requires strategic planning for a TL classroom. However, the researchers acknowledge that the design of such classrooms differs across contexts largely depending on the teachers' ideologies and multilingual experiences and on the school and community in which those teachers work.

Forms of Translanguaging: Strategic and Spontaneous Translanguaging

While García et al. (2017) call for purposeful strategic TL in classrooms, TL per se can occur spontaneously. Cenoz (2017) and Cenoz and Gorter (2015) distinguish between the two forms of TL in relation to context. The researchers assume that pedagogical TL encompasses planned instructional strategies that intentionally integrate the learners' home language(s) with the language of instruction, but also spontaneous TL, which refers to the complex and fluid discursive practices in which MLLs naturally engage without prior planning. As such, spontaneous TL is regarded as the "universal form of translanguaging" (Cenoz & Gorter, 2015, p. 4) since it can occur in any context, be it inside or outside the classroom.

Recent sociocultural research on learning has called for the integration of TL into instruction for its potential to improve content education and language proficiency (Blackledge & Creese, 2010; García, 2009; García & Wei, 2014; Otheguy et al., 2015) especially when learning a challenging school subject such as science. In the K-12 educational landscape, some researchers went into designing TL classrooms or implementing instructional strategies that integrated the full linguistic repertoires of learners while others explored how TL took place naturally in classrooms. This review offers next a summary of some studies highlighting the affordances of adopting spontaneous and/or pedagogical TL in multilingual science classrooms.

TL in K-12 Science Classrooms

In general, studies on TL in K-12 science classrooms suggest that TL supports students' meaning making, conceptual understanding of complex science concepts, engagement in scientific practices, and identity expression.

For instance, Poza (2018) explored the linguistic practices and interactions of multilingual 5^{th} graders in a science classroom in San Francisco. The design of the instructional activities and the flexible practices of the teacher invited students to bring their prior knowledge, experiences, and home languages into the classroom. By creating a TL classroom, the teacher nurtured students' collaboration and translingual practices as he invited them to dynamically utilize English and Spanish across various modalities. Students' TL was also claimed to emerge as an act of resistance to the prevailing language separation policies at their school.

In a more recent study, Charamba (2020) investigated the effectiveness of TL practices on 40 bilingual fourth graders' understanding and achievement in a collaborative science and technology classroom. Charamba randomly assigned students to an experimental group that received translanguaging-informed instruction and a control group that received traditional monolingual instruction. The students in the experimental group scored higher in the post-test of achievement. They also seemed to rely on their repertoire of the first language to express their ideas, better understand the topics, and engage in class and group collaborative discussions. Thus, many academic benefits might be achieved when promoting students' access to their first language.

Song and Cho (2018) conducted a study to explore the TL strategies used by five middle-school bilingual Korean-English students during online inquiring and reading about scientific topics. Before the online inquiry task, students were engaged in a writing task about a scientific topic of their choice in English. During their search and reading about the topic, students were asked to think aloud and verbalize all their actions (e.g., typing a search term) in their preferred language(s). Students' screen reading behavior (e.g., selecting links, retrieving web pages, etc.) and self-reports were recorded. After 40 minutes of searching the internet, each student prepared three PowerPoint slides in English about his/her topic. The finding of the study revealed that around 37% of the total online strategies used by the students (e.g., information comprehension, information evaluation, and self-monitoring) were accompanied by TL practices. Hence, the researchers claimed that students benefited from their repertoire of the first language to understand science in a foreign language. The TL practices they used seemed to play a critical role in facilitating their gain of knowledge and deepening their processing of the content as they engaged in paraphrasing and interpreting the online read texts. Consequently, the researchers recommended the development of pedagogical methods that support bilingual students in learning science and the reconceptualization of the internet as a rich multilingual textual learning environment in this digital age.

Further, some researchers explored how TL could influence students' engagement in scientific practices. For example, Garza and Arreguín-Anderson (2018) explored the use of TL in relation to students' reasoning when engaged in scientific inquiry. They reported that TL facilitated the performance of a cognitively demanding scientific practice - i.e., observation in a pre-K-5 science classroom. The teacher's smooth switch between the languages facilitated students' "understanding of the scientific concepts so that students became scientifically literate in both languages… and promoted linguistic connectedness with her students" (p.12-13). Students were able to utilize both languages successfully to explore materials, record and communicate observations, connect to previous knowledge, and cognitively engage in group and whole-class discussions, construct knowledge, enhance their science learning. Additionally, Licona and Kelly (2020) examined how TL was employed in an English-Spanish dual-language middle school science classroom. The researchers used ethnographic data to investigate the teachers' use of TL while framing a scientific epistemic practice - i.e., argumentation about sociocentric issues. The analysis of the data indicated that TL was used by the teacher to maintain the classroom culture, facilitate students' learning, and articulate argumentation. These findings imply that TL could help the teacher in actualizing his/her TP. Additionally, Licona and Kelly suggest that TL could potentially promote the performance of other scientific practices and should be used as a pedagogical strategy that is responsive to students' linguistic and cultural backgrounds.

The findings from these studies imply that TL can create an inclusive social space for learners where their linguistic and cultural backgrounds could mediate their learning in academic contexts. Hence, TL is considered a student-centered strategy that could promote the deployment of an experiential socioconstructivist approach to learning, thus, unifying the private and the shared worlds of the learners, which are the anchors of the CoI framework.

Attitudes Toward the Use of Translanguaging in Classrooms

Existing literature on the attitudes toward pedagogical TL reveal that students (Wang & Shen, 2023) and teachers (Al-Bataineh & Gallagher, 2021) have ambivalent attitudes toward the deployment of TL practices in classrooms. For instance, students may exhibit neutral to positive (Fang & Liu, 2020) and very positive (Moody et al., 2019) attitudes toward teachers' TL practices. Teachers as well exhibit mixed attitudes towards the use of TL (Al-Bataineh & Gallagher, 2021). Fang and Liu (2020) posit that teachers recognize the contribution of TL to establishing social relations, building rapport, and nurturing students' conceptual understanding. Nevertheless, monolingual ideology, school language policy, and concerns about second language acquisition influence teachers' practices and attitudes toward TL. Notably, García-Nevarez, Stafford, and Arias (2005) found that teachers increasingly developed negative attitudes toward the use of students' home language in instruction as the number of years of teaching experience increased. As such, teachers may resist the utilization of TL in their classrooms despite the recognized affordances of TL.

In the science classroom, Charamba (2020) explored the attitudes and practices of twenty-five pre-service science teachers toward TL using a questionnaire adapted from Cohen et al. (2013), classroom observation, and semi-structured interviews. Most of the teachers assumed that low proficiency in the language of instruction evokes misconceptions and underperformance in science. All the teachers who responded to the questionnaire (22 out of 25) agreed that the use of TL can help avoid misunderstanding of scientific concepts and enhance students' performance in science. Classroom observations revealed that TL created a space conducive to learning in heterogeneous multilingual science classrooms. Further, interview analysis supported the former findings suggesting that TL nurtured students' desire and continuity to learn science. As such, Charamba, in agreement with other researchers (Charamba et.al 2019; Seah & Yore 2017) posits that TL supports students to create "links and relationships between their various languages and the scientific concepts" (p. 127), empowers students to use their voices, and "allow[s] room for more insurgent knowledges to destabilize and subvert the colonialities of power (Yuvayapan 2019), knowledge, and being (Karlsson et al. 2018) inscribed in dominant literacy and science classrooms (Velasco & García 2014; Yuvayapan 2019)" (p. 128).

In their review, de Boer et al. (2012) elicit that there is no consensus on the definition of attitudes. In this study, I broadly adopt the definition suggested by Eagly and Chaiken (1993), an "attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (p. 1). This definition allows the exploration of the attitudes of the teacher and students toward the approach to language use as well as toward TL – i.e., whether or not they favor the linguistic practices of the teacher as well as TL in the studied physics classroom.

Translanguaging and the Community of Inquiry Framework

There is a paucity of research integrating the theories of TL and CoI. Only one study (Annamalai, 2017), to the best of my knowledge at the time of conducting this study, explored the three elements of CoI along TL[1] with codeswitching, rather than TL. In this study, Annamalai engaged 10 Malaysian high school students in learning English as a second language in an online learning environment. The participating students were used to code-switching as a daily life practice in Malaysia. They were asked to write three essays on a Facebook chat group. The analysis of the chats revealed that CP dominated the discussions followed by SP and TP. Nevertheless, not all the descriptors of the three presence types were evident in the discussions. Annamalai suggested that the nature of the tasks (narrative writing) and students' poor knowledge of the topics may have limited their engagement. Annamalai also observed some codeswitching in the chats (but not in essays), where students tended to draw on their linguistic repertoires to understand the meaning of words. Nevertheless, Annamalai did not thoroughly elaborate on this finding or explicitly link it to any of the presences. She recommended that the descriptors of each presence in the CoI framework be adapted to the context of learning (e.g., the types of the learning tasks and the social and cultural context of the learners). For example, in her study, the students were engaged in integrating examination tips in a language other than the academic language. Hence, Annamalai suggested adapting the CoI framework to the academic tasks as well as the social and cultural contexts of learning. Annamalai also recommended integrating 'examination tips', 'social learning presences', and 'codeswitching' as descriptors of the academic tasks as well as the social and cultural contexts of learning when the CoI framework is used in Malaysia.

[1] Annamali actually used the term *codeswitching* rather than *translanguaging*. However, this terminological difference does not reflect a theoretical difference since in this study, the term *codeswitching* was used to refer to the everyday cultural languaging practices of the heterogenous communities of people living in Malaysia – i.e., consisting of people of Malay, Indian, Chinese, and other minority groups.

Another study that established an explicit link between TL and the SP of the CoI framework was conducted by Satar (2020) in an online language-learning course. Assuming that distance learning challenges students' participation and interaction, Satar claimed that the use of learner's first language promoted the actualization of SP and consequently sustained online communication, interaction, and cohesion in multilingual settings (Rourke et al., 1999). Additionally, Satar assumed that one contributing factor to effective computer-mediated learning is to employ all the learners' "communicative repertoire and all aspects of their multiple identities, one of which is their L_1 [first language] identity" (p. 149). In corroboration, Walker (2017) also suggested that TL practices not only promote SP but also afford learners to project their first language identities and "effectively negotiate [their] positions with others, which are valued skills in a globalized, complex and multilingual world" (p. 20).

An assumed extension of Satar's findings is that the use of the first language can potentially promote the three presences in a CoI. This assumption stems from the definition of the three presences and CoI per se, which illuminate the foundational role discourse plays in bridging the reflective private world of the individual and the shared public world of society. The CoI theory and framework are based on communication and interactions between the learners and the teacher, the learners and the learning environment including subject matter content, and the learners themselves. Language lies at the heart of the tripartite structure of CoI. For instance, for learners to develop CP, the ultimate goal of CoI, they have to actively engage in the four phases of critical thinking and practical inquiry. They have to understand the problem posed by the teacher in the form of a triggering event in addition to the abstract subject matter concepts. They are expected to iteratively move between reflection and collaborative discourse to explore, integrate, and resolve the problem. But if learners do not understand the language of learning and teaching, how can they develop conceptual understanding of subject matter and engage in the classroom discourse, a question underscored in a report by UNESCO (2016). The issue of language in a CoI might be more complex in science classrooms where learners are expected to engage in scientific practices for the discourse of scientific practices "demands both receptive and productive language skills" (Quinn, Lee, and Valdés, 2012, p. 2).

On another hand, while other researchers may have not used CoI framework specifically in connection to TL, some have explored TL with the key aspects of teaching and learning that could be viewed from the CoI perspective. Examining such studies from the lens of the CoI framework illuminates certain roles that TL, particularly the use of first language, plays in science instruction. For instance, in the aforementioned study, Song and Cho (2018) explored the impact of TL on students' learning in an online inquiry-based learning environment. The researchers reported that TL - i.e., the fluid use of first language and the LoLT - helped students to comprehend online texts, verbalize their thoughts, construct meaning, make sense of scientific concepts and engage in metacognitive skills. One could argue that these findings suggest that the learners exhibited CP; hence, providing evidence of the contribution of the use of learners' first language (along with LoTL) to the actualization of this type of presence. However, since students were asked to work individually on the tasks in this study, SP was relatively absent. As for TP, the researchers who played the role of the teachers did not intervene in students' learning. Notwithstanding, their presence as teachers was evident prior to the task when they designed the learning environment (online research inquiry-based learning) and after the completion of the task, when they assessed students' learning.

Furthermore, in an after-school community-based science club in which TL was used as an intended pedagogical strategy, Ryu (2019) postulated that engaging Korean-English bilingual students in various ways of learning encourages them to both translanguage and learn new science concepts. To motivate students to translanguage in the designed science club, they were engaged in various forms of learning (e.g., preparing presentations, writing, and online activities), provided texts in both languages, and asked to work in language groups. To model the use of TL, the teacher used both languages fluidly when writing and speaking and asked students to frame their ideas in English after sharing them in Korean. While performing the tasks, the researcher observed that students' scientific and linguistic sense-making were co-developing. The researcher also reported that TL practices served to accomplish sense-making and social functions. In this study, TL seemed to sustain students' communication, solidarity and affective expression. Although not mentioned by the researcher, these findings suggest that TL promotes the enactment of CP, SP, and TP.

In brief, the process of learning science as a practice necessitates engaging students in scientific inquiry which lies at the heart of the CoI framework. However, the complexity of science as a subject, the extensive use of technical language particularly when engaging in the scientific practices, on the one hand, render science a challenging and less accessible school subject for MLLs learning science in a foreign language. On the other hand, it may hinder the operationalization of CP, SP, and TP. Hence, relying on the reported benefits of TL summarized in this section, this study assumes that the utilization of TL, whether spontaneous or strategic, could promote the enactment of the three presences.

The Context of the Study

In several countries in the Arab world, science learning is offered in foreign languages (Amin & Badreddine, 2020). In Lebanon, for instance, the national language is Arabic, but science is taught either in English or in French. This language in education policy is associated with the history of colonialism in the country and sustained by globalization (Shaaban & Ghaith, 1999). What makes the situation even more complex is the diglossic nature of the Arabic language (Amin, 2009; Amin & Badreddine, 2020). Recent studies in the Arab world revealed that the major constraint for the Arab students' underachievement in science is the language of instruction (BouJaoude & Dagher, 2009).

The issue of language has attracted interest in Lebanon very recently. Research reviews conducted by BouJaoude and Abd-El-Khalick (2004) and BouJaoude, Abd-El-Khalick and El-Hage (2009) show that the language of instruction is found among the major challenges to science education. However, these reviews lament a paucity of research on the issue of multilingualism. In response to these findings, Amin (2009) raised a call for researching these issues in the Arab world suggesting some research questions, such as whether science is better taught in Arabic, in an international language, or in both languages. Two other crucial contextual questions that Amin suggested are associated with the role of local dialects in education and the implications of the diglossic nature of the Arabic language in education.

In response to this call, a few studies have been conducted in Lebanon to highlight the challenges faced by MLLs while studying science. In their theses, Radwan (2013) and Badreddine (2019) investigated ELLs' comprehension of non-technical terms in science textbooks in Lebanon. The importance of these studies stems from two assumptions. The first assumption is that learners' proficiency in nontechnical terms in science texts is essential for science learning and may have a positive impact on science achievement (Ali & Ismail, 2006). The second assumption is that ELLs face more challenges than native language learners in understanding non-technical terms because they are expected to learn the language of science while they are still developing their reading and literacy skills in LoLT (Tong, Irby, Lara-Alecio, Koch, 2014). Interestingly, Radwan (2013) and Badreddine (2019) had similar findings in elementary and middle schools respectively; ELLs struggle to understand most of the non-technical terms in science texts in grades six, seven, eight, and nine.

Furthermore, Amin and Badreddine (2020) compared teacher-student interactions in two 1st grade class sections in Lebanon where science was taught in Arabic. The two classes were taught by different science teachers at the same school, which served students of middle SES. One of the teachers mainly used MSA while the other mainly used the Lebanese Dialect (LD) – students' home language. However, both teachers switched between the two forms of Arabic and viewed the LD as a rich linguistic resource. The latter teacher also assumed that MSA is a foreign language for students who may start a statement with it but then switch to LD due to their limited proficiency in MSA at this age level. The teacher-student interactions observed in the classes were found to follow a strict IRF discourse pattern: I (teacher) R (student) F (teacher). However, students who used more LD broke this pattern more frequently as they initiated conversations and followed up on other students' responses. Hence, the researchers concluded that the use of home language seems to support a "more conversational interaction style" in the science classroom (p.36).

While the previous study shows a difference in teachers' multilinguistic practices between two varieties of Arabic at the same school, Salloum and BouJaoude (2017) reported that there exists a difference in teachers' multilinguistic practices between home language and English at different schools. The two researchers explored the language practices used at four different Lebanese multilingual schools (two public and two private schools) and their effect on students' conceptual learning. They video-taped science lessons in four grade eight classes and interviewed the participating teachers and students. The analysis of teacher-student interactions revealed that the discourse followed the Initiate-Response-Follow up (IRF) pattern characterized by 'Systematic Barrage'. However, similar to other studies (e.g., Feng, 2009; Salloum & BouJaoude, 2020), the researchers found that the linguistic practices were associated with socioeconomic status (SES). Students of higher SES are more proficient in foreign languages since they are exposed to them at a young age home and, hence, are expected to perform better in standardized tests conducted in foreign languages.

Furthermore, Salloum and BouJaoude (2017) found that teachers in the private low-middle SES schools strictly followed school policy prioritizing the use of English language even at the expense of students' learning of the science concepts. This tendency to exclusively use English could stem from the belief that the use of the home language is a deficit practice (Martin, 2005; Probyn, 2009, 2015). Meanwhile, teachers from low SES public schools used Arabic more frequently to explain and elaborate on science concepts and scaffold students' learning and science discourse. In both public and private schools, most of the students used Arabic to express their understandings and ask clarification questions meanwhile they used English to share short factual answers. Although the researchers describe the switch between the LD and English in public schools by “fluency”, they claimed that this fluency maintained only code-switching rather than TL as articulated by García (2009). Salloum and BouJaoude (2017) associated this finding with the aspects of the education system in Lebanon - i.e., authoritarian, content-centered, and test-driven teaching and learning. Another reason for this finding could be the fact that teachers’ education programs do not prepare teachers for working with multilingual students. Acknowledging the political, socioeconomic, and power dynamics associated with language-in-education policies, the researchers suggest that the adoption of a ‘TL mode’ might “grant Lebanese students and teachers’ opportunities to use freely and purposefully their rich repertoires for enhanced learning of content” (p. 25).

Given that the issue of language use in multilingual contexts is not understood in general especially in the Arab world and the paucity of relevant research in the region (Amin, 2009), the primary aim of this study is to further explore the phenomenon of TL in the science classroom. In particular, this study explores whether and how TL can promote the enactment of CP, SP, and TP in addition to illuminating the attitudes of the participants towards the approach to language use adopted in the science classroom and toward the deployment of TL.

CHAPTER 3

METHODOLOGY

Overview of Research Design

The purpose of this study is to understand how translanguaging (TL) is utilized in a Lebanese science classroom and what roles TL plays in the enactment of the cognitive, social, and teaching presences. The study was conducted in a Lebanese K-12 private school that is representative of many other schools in Lebanon. The school is identified as an anglophonic school adopting an English-only school policy for the teaching of sciences and mathematics starting from first grade. One grade seven physics classroom was recruited for this study. The 7th grade class was of particular interest to the researcher since in this grade level science is taught as specialized subjects (Biology, Chemistry, and Physics) for the first time. The researcher observed the teaching and learning practices and the languages used in this classroom in a naturalistic setting without introducing any intervention to explore the following research questions:

1. What is the quality of the learning in a Lebanese classroom as understood from the perspective of the Community of Inquiry (CoI) framework?
2. What roles does translanguaging play in enacting the cognitive, social, and teaching presences?
3. What are the teacher's and learners' perceptions of the three types of presence in the physics class?
4. What are the teacher's and students' attitudes toward the adopted approach to language use in the classroom as well as their attitudes toward the use of translanguaging in instruction?

To answer the research questions, the study adopted a mixed methods approach where quantitative and qualitative measures were employed to collect and analyze data. Qualitatively, the coding scheme of the CoI was used to identify instances of occurrence of cognitive, social, and teaching presences in the classroom. A particular focus was attuned to the use of TL and how it served to enact the functions of each presence. For the qualitative analysis, NVivo software was used for coding each type of presence, the language used, and the speaker (teacher or student) of the coded utterances. Furthermore, four students were selected for a follow-up semi-structured interview to gain an in-depth understanding of their perception of the quality of their learning experience, in addition to their attitudes toward the approach to language use and toward the utilization of TL in the physics classroom.

Quantitatively, NVivo software facilitated the assignment of frequencies to the indicators of CP, SP, and TP. The generated descriptive statistics (frequencies and percentages) allowed the identification of patterns across the teaching and learning interactions as well as co-occurrences between language use and particular types of indicators. Further statistical analysis (Chi-Square test) was used to test 1) whether there was a relationship between the languages used (English only, Arabic only, Mixed) and the presences (cognitive, social, teaching) and 2) whether there was a relationship between the language used and the categories of each presence type. In addition to the quantitative data generated by NVivo regarding classroom discourse, all the students were asked to respond to the adapted CoI survey to examine their perceptions regarding the quality of the learning environment from the lens of the CoI framework.

Participants

For the purpose of this study, data was collected from an intact grade seven physics classroom in a K-12 school in Beirut. The school serves low SES Lebanese communities. Students who attend this school predominantly use Arabic (i.e., Lebanese dialect) at home as opposed to the foreign languages (e.g., English or French) that are officially used as the media of instruction of the national science and mathematics curricula. Although the participating school adopts an English only policy for the teaching of science and mathematics, the degree of enforcement of this policy varies among the teachers within the same school. For instance, a few teachers, including the teacher participating in the study, use some Arabic in their classrooms. Students too use both languages but to varying degrees in each subject, primarily depending on the classroom norms set by each teacher.

The participating physics classroom included 21 multilingual students, 13 girls and 8 boys, who were 11-12 years old. Similar to other schools in Lebanon, the participating students were attending the school for the first year after the breakout of COVID-19 and after the spark of the 2019 revolution in Lebanon The participating teacher was a 55-year-old male who had more than thirty years of experience in teaching physics in Lebanon and spoke Arabic, as a home language, English, and French. In the year during which this study was conducted, the teacher was teaching at three schools: the research site for the fourth year, an Armenian private school, and a public high school. The teacher was also co-authoring a physics guide for 9th grade high-stakes official exams. Additionally, the teacher was tutoring low-achieving students privately after school time as another source of income.

The multiple jobs the teacher had reflected the economic situation in the country. In October 2019, the Lebanese people protested against the newly proposed taxes and the corruption in the government. Alongside the global economic recession engendered by the COVID-19 pandemic, governmental corruption led to an inflation rate of 222.88% in April 2022 (Aoun, 2022) during the time of the study. The inflation, in turn, led to more protests and school closures which adversely impacted the learning experiences of students, especially those with low SES. For instance, schools serving low SES communities weren't prepared for distance education. The deteriorating infrastructure in Lebanon posed more challenges; many students and teachers had accessibility problems to reliable internet connection and electric power supply. As a result, the Ministry of Education and Higher Education reduced the curriculum to be enacted for the 9th and 12th grades which undergo official examination[2]. Schools also, accordingly, reduced the curriculum for the other grade levels. When students returned to face-to-face learning for the academic year 2021-2022, teachers realized that students lacked pre-requisite knowledge and skills, including proficiency in the language of instruction. These challenges were underscored by the teacher in the interview.

As for the physical learning environment, the classroom was crowded with students' desks and the teacher's desk. There were five rows in the classroom, each with five desks. The desks in the 2nd, 3rd, and 4th columns were stacked with no space in between, obstructing the movement of the teacher and students. Following COVID-19 safety precautions was also challenging as social distancing was not possible in such a crowded classroom. The teacher complained about the crowdedness and risk of being infected with COVID-19 several times in class for he caught COVID-19 twice from

[2] The Ministry of Education and Higher Educationeven cancelled the official exams in 2020 and 2021

students earlier in the same school year. Electricity outages also impacted the organization of the classroom. The teacher mainly used the interactive board and students' desks were oriented towards that board. However, upon electricity outages, students had to move their desks and chairs to face the whiteboard mounted on another wall. These transitions caused some chaos and the teacher lost time establishing etiquette and setting up the physical learning environment.

Data Collection Tools

Video Recording

To collect data about teacher's and students' interactions and their language use, the researcher attended the physics sessions, as an observer, over a four-week period starting March 16, 2022, and video recorded the session. Students were taught physics twice per week as dictated by the Lebanese curriculum for middle school. However, in the fourth week, one physics session was canceled because students were attending a school play. Hence, seven sessions were video recorded in total. The camera was placed in the back of the classroom capturing the participating students from the back, the teacher, and the board. The researcher took field notes as well and audio recorded the sessions as a backup. Subsequently, the researcher developed verbatim transcripts of the videos using Arabizi[3] which is a transliteration method that uses Latin letters and numerals to represent Arabic letters that don't exist in English. In these transcripts, the researcher added a brief description of the movement and the gestures of the speaker. For confidentiality, the researcher avoided using students' names in the transcripts. She used the symbols *S* for *student*, *S(same)* to indicate that the *same student* was still

[3] a portmanteau of the Arabic words for Arabic and English: Arabi + Englizi = Arabizi.

talking, *Ss* to indicate that *two or more students were speaking simultaneously*, and *T* for *teacher*.

Community of Inquiry Survey

The community of Inquiry (CoI) survey (see APPENDIX A) was initially developed by Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson, and Swan (2008). It includes 34 question items targeting the three types of presence. However, for the purpose of this study, the questions were adapted to face-to-face instruction. The adaptation included the deletion of item 17 “I felt comfortable conversing through the online medium” since when changing ‘online medium’ into ‘face-to-face medium’ the item becomes very similar and almost equivalent to item 18 “I felt comfortable participating in the course discussions”. Hence, the adapted survey included 33 question items. The first 13 items measured the Teaching Presence (TP). Items 14–20 measured the Social Presence (SP) and items 21–33 measured Cognitive Presence (CP). Two versions of the survey were initially prepared in English, one for the students (see APPENDIX B) and one for the teacher (see APPENDIX D). However, piloting the survey with students elicited the need to translate it into Arabic (see APPENDIX C). Hence, the survey was shared with students in Arabic and with the teacher in English.

Students’ Survey. In addition to adapting the questions to the face-to-face learning environment, the term ‘instructor’ was replaced with ‘teacher’ since the latter is the term used by students. Also, ‘course participants’ was changed into ‘students’, and ‘course’ was replaced by ‘physics subject’ or ‘physics lessons.’

The adapted survey was piloted with three 8th-graders separately. The researcher asked the English teacher to select three students having different English proficiency levels: above average, average, and below average. The researcher met with the students during an Arabic language class when their teacher was absent. The researcher briefly explained the purpose of the study and the survey and provided a hard copy of the survey. She also asked the students to read each item aloud, share their understanding of the questions, and underline any term or phrase they didn't understand. The three students experienced difficulty understanding most of the question items and asked for the meaning of at least one term in almost each question item.

Therefore, the researcher translated the survey into Arabic and piloted it again with three students. The translated survey was first piloted with the student who had average proficiency in English and had already met with the researcher in the first pilot. When the student saw the translated survey, he smiled and expressed his content to read and respond to the questions in Arabic, his home language. The student was able to make sense of all the question items. Similarly, the two other students with whom the survey was piloted expressed a high level of understanding of the question items. However, they weren't confident with the meaning of a few Arabic terms and preferred to have them written in English. For example, the three students asked about the meaning of the term 'العصف الذهني'. The researcher explained the term in Arabic as 'المناقشات الجماعية لانتاج الأفكار: group discussions to generate ideas', yet the students didn't exhibit an understanding of the phrase provided in modern standard Arabic (MSA). Thereby, the researcher provided an example in the Lebanese dialect which triggered the students to link to the strategy which their English teacher engages them in, 'you mean brainstorming!' said a student. Consequently, the researcher added the translation of these terms between parentheses to the survey (see APPENDIX A).

Teacher's Survey. As for the teacher, a few terms were changed to fit the studies context. For instance, the term 'instructor' was replaced by the pronoun 'I', 'course participants' was changed into 'students', and 'course' was changed into 'subject' and sometimes into 'physics lessons' depending on the statement. Accordingly, other adaptations were made, mainly at the verb level, to maintain the subject-verb agreement. Concerning language, the survey was prepared and shared with the teacher in both languages, English and Arabic, yet the teacher preferred to respond to the English copy (see APPENDIX D).

The teacher's and students' responses were assigned scores using a Likert scale that ranges from (1 = Strongly Disagree) to (5 = Strongly Agree).

Audio Recorded Semi-Structured Interviews

At the end of the four weeks, the teacher, and a purposive sample of four students were interviewed. The sample included one student with a high score, one with an average score, one with a below-average score, and one student who had a remarkable difference in his/her scoring for the three presences. The interview questions (see APPENDIX E) addressed the quality of the learning experience to gain an in depth understanding of the interviewees' responses to the CoI survey, their attitudes toward the approach to language use adopted in the physics class, and toward the use of TL. Questions addressing the learning experience were derived from the CoI survey. They were used as prompts to trigger students' reflections on CP, SP, and TP. Concerning students' attitudes regarding language use, they were asked about the language(s) used by the teacher and themselves in the classroom and how they believed the adopted approach impacted their learning and interactions. As for their attitudes toward TL, they were asked about whether and why (or why not) they wished the teacher translanguaged (used Arabic along with English).

The interviews were audio-recorded and verbatim transcripts were prepared in Arabizi by the researcher.

Data Collection Procedure

Following the receipt of the International Review Board (IRB) approval, the researcher initiated contact with the school principal to introduce the study and seek authorization for conducting the study. A letter introducing the study was shared with the school principal. A letter introducing the study was shared with the school principal. After the school principal signed the letter, the researcher emailed two science teachers (the biology teacher and the physics teacher) who were identified by the principal as eligible for the study since they were bilingual/trilingual teaching science for seventh grade. Only the physics teacher expressed an interest in participating in the study. The researcher met with the teacher at school to introduce the research purpose, methodology, and data collection instruments and procedure. The teacher signed the consent form at the end of the meeting. Following that, the researcher visited the physics class taught by this teacher. She briefly introduced the study to them and distributed to each student two copies of the preliminary child assent form (one in English and one in Arabic) and two copies of the preliminary parental permission form (one in English and one in Arabic). However, in these forms, students and their parents weren’t informed specifically that the nature of their interactions and their language use would be analyzed to avoid any influence on their interactions. They were told in broad terms that the researcher is interested in studying how physics teaching in a face-to-face setting (and in a hybrid setting in case one of the students had COVID-19 and joined online) is being approached at the school. Consequently, since the forms shared with the students and their parents didn't include all the research objectives, the researcher conducted a debrief session at the end of the study. After that, she distributed to each student, two copies of a child assent form (one in English and one in Arabic) with all the study objectives and two copies of the parental permission form (one in English and one in Arabic) with all the study details. 11 students signed both forms at the beginning and the end of the study. The data of these consented students were used in this study.

After the preliminary consent forms were signed by the participating students and their parents, the researcher started attending and video recording the sessions in the physics classroom. The teacher and the researcher had spontaneous unplanned brief weekly conversations that usually occurred on Thursdays after each session. At the end of the four-week period, the teacher and the students were asked to respond to the adapted and translated CoI survey. The adapted survey was shared with the teacher in English and Arabic andthe teacher filled out the English version. As for the students, they were offered the translated and adapted version of the survey. Following regular administrative procedures, the grade level supervisor shared the link to the survey on the class WhatsApp group and asked those students who consented to voluntarily respond to the survey within a one-week period. Only 10 students responded to the survey. Further, the researcher conducted semi-structured interviews with the teacher and a purposive sample of four students to gain an in-depth understanding of their perception of the learning experiences, attitudes towards the approach to language use, and attitudes towards TL.

Data Analysis Procedures

A mixed methods approach was used to analyze the data collected in the study. Classroom discourse was analyzed qualitatively and quantitatively using the CoI framework to answer the first two research questions. The teacher's and students' responses to the adapted CoI survey were analyzed quantitatively using a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree) to answer the third research question. The semi-structured interview transcripts were analyzed thematically such that codes we inductively identified to answer the fourth question. Finally, the data from the three sources were examined to illuminate any alignment/ unalignment in the results.

Video recorded Sessions

Verbatim transcripts of the video recorded sessions were prepared. Since the camera was positioned at the back of the classroom and the students' faces weren't visible, it was very challenging to identify the identity of each speaker. Hence, the transcripts included the utterances of all students in the classroom, yet the identities of students were not preserved in the transcript. For confidentiality, the researcher avoided using students' names in the transcripts. She used the symbols *S* for *student*, *S(same)* to indicate that the *same student* was still talking, *Ss* to indicate that *two or more students were speaking simultaneously,* and *T* for *teacher*.

After preparing the transcripts, the researcher coded the transcript of each session at three levels: speaker (teacher or student), language (English only, Arabic only, French only, Mixed), and CoI presence indicator. However, since the CoI framework was initially developed for analyzing and designing computer-based learning environments, it needed to be adapted to a face-to-face setting in general and to the context of the study. The subsequent paragraphs provide a description of the adaptations made and the implementation of the framework. The examples provided in the adapted coding scheme are copied from the studied classroom conversation transcripts. The underlined words or phrases are translations of what was uttered in Arabic.

Adapting the CoI Framework. The below paragraphs include the adaptations that were made to the categories and indicators of each presence type to fit the face-to-face learning environment in the studied classroom.

Cognitive Presence. A few adaptations were made in each category of CP (Table 2).

Triggering Event category: The framework developed by Garrison et al. (2001) includes two indicators in this category, *recognize a problem* and *sense of puzzlement*. However, in an attempt to adapt the CoI framework to a synchronous setting, McDonald and Loch (2008) suggested the addition of the indicator, *new topic* for it is common in synchronous (or face-to-face settings) that the teacher or students introduce new topics. Since during the observed sessions, a new chapter was introduced, the indicator *new topic* was added as a third indicator of the *Triggering Event* category.

Exploration category: In the initial coding scheme for CP (Garrison et al., 2001), the *Exploration* category includes six indicators. The first indicator, *divergence within an online community* was changed into *divergence within the community* to match the context of the study. No changes were made to the other indicators. However, four indicators of *Exploration* were added. Three of the added indicators, *confirming understanding, confirming no understanding,* and *student repeats* (with implied questioning, thus conveying implicit divergence in ideas) were actually suggested by

McDonald and Loch (2008). Those two researchers also suggested the indicator *questions on topic* most probably as an alternative to the *information exchange* indicator. However, in this study, the *information exchange* indicator was maintained and the descriptor *questions on topic* was added to this indicator. The fourth added indicator was *trivial expressions.* This indicator referred to instances where students asked trivial questions or shared trivial comments that indicated their CP such as asking about the order of paragraphs to be copied from the board or saying that they can't see the figure clearly. Although in the initial framework, Rourke et al. (1999) assumed that such *trivial expressions* fell under SP, in this study it was assumed that asking such questions implied students were cognitively present.

Integration category: no additions or adaptations were made to this category.

Resolution category: this category initially included three indicators, *various applications to the real world*, *testing solutions,* and *defending solutions*. However, in the video recorded sessions, there were no instances of students actually testing solutions. Instead, there were instances where they reflected on their solutions particularly in the session during which they had an assessment. These instances included moments where students self-evaluated their responses and reflected on their understanding. While such moments may convey testing solutions, the indicator *testing solutions* was replaced by the broader indicator *reflection* which in this study refers to instances in which students reflect on their responses, the learning content and outcome, and the learning process. It is worth mentioning that *reflection* as an indicator of CP was suggested by Redmond (2014) to refer to instances in which students reflected on their learning experience, learning outcome, and learning process.

Social Presence. A few edits were made only to two categories of SP: *Interactive (Open Communication)* and *Cohesive* (*Group Cohesion*) categories (Table 3**).**

Affective Expression category: no changes were made.

Open Communication category: since the examined learning environment occurred in a face-to-face setting, the following indicators of interactive communication were deleted: *continuing a thread*, *quoting from other's messages*, and *referring explicitly to others' messages*. However, other indicators of interactive *Open Communication* that emerged in students' interactions were added. These indicators were: *requesting permission to participate, requesting permission for non-academic purposes* (e.g., going to the restroom, bringing their jackets from the wall-mounted coat hangers outside the classroom), *managing turn-taking*, *classroom management*, and *technical issues and support*.

Group Cohesion category: only one indicator was added to this category of SP. This indicator is *sharing language, culture, and religion.* For example, some of the religious expressions which students shared were "Peace be upon you", "swear by God", "Oh, God!", and "Allah is the greatest!". One cultural expression or cultural stereotype was shared by a female student complaining about the focus of physics on what is thought to be male-related topics, i.e., electricity and mechanics, "Teacher, can we, girls, study something else? Can we girls study another topic? We won't be working in electricity-related jobs [in the future]". Also, one phrase shared by the teacher about shared language was, "We will explain a bit in our Arabic language".

Teaching Presence. Likewise, a few adaptations were made to two categories of this presence type to fit the face-to-face setting and the context of the classroom itself (Table 4).

Instructional design category: The indicator *establishing netiquette* was changed into *establishing etiquette.* The indicator *utilizing the medium effectively* was changed into *setting up the space for learning* (e.g., closing the windows due to noise outside, turning on/off the lights and fans). Five indicators of instruction design in the observed classroom were added: *checking up on students' fulfillment of tasks* (e.g., asking students whether they have done their homework), *providing directions for assessment*, *grading*, *responding to students' permission requests*, *setting up* and finally *introducing instructional tools*.

Facilitating discourse category: no changes were made to the indicators of this category of TP.

Direct instruction category: six indicators of this category of TP were added. These indicators were *explaining terminology, teacher repeats* (what he has already said), *specifying the language to be used, scaffolding, clarifying assessment prompts,* and *creating solutions* (for the questions students pose or don't know how to respond to). The last indicator emerged as the teacher often rushed, without wait time, to provide solutions to problems either posed by himself, the textbook, or other students.

Table 2

The Adapted Coding Scheme for CP

Category	**Indicator**	**Sociocognitive processes**	**Example**	**Code**
Triggering Event *Descriptor: Evocative (Inductive)*	Recognize a problem	Presenting background information that culminates in a question	"Exercise 1: Complete the sentences below using the appropriate word."	CP-TE-1
	Sense of puzzlement	Asking questions Taking a discussion in a new direction (changing direction)	"<u>Does our body conduct electricity? Can I turn on a lamp?</u>"	CP-TE-2
	New topic	Introducing a new topic (e.g., reading about the new topic from the textbook)	"The symbol of the ammeter is a circle containing a letter A."	CP-TE-3
Exploration *Descriptor: Inquisitive (Divergent)*	Divergence within the community	Unsubstantiated contradiction of previous ideas		CP-EX-1
	Information exchange	Personal narratives/ descriptions/ facts (not yet used as evidence to support a conclusion)/ questions on topic including asking about the meaning of words	"<u>Teacher, what does</u> *consume* <u>mean?</u>"	CP-EX-2
	Suggestions for consideration	Author explicitly characterizes an utterance as exploration	"<u>Can we draw the</u> closed circuit <u>like this?</u>"	CP-EX-3
	Brainstorming	Adds to established points but does not systematically defend/Justify/develop addition (a word or a phrase)	"Perhaps I could use…"	CP-EX-4
	Student repeats	Students repeating after the teacher or each other with implied questioning	S: "<u>The first one (part)</u> is no <u>because of the</u> open switch?"	CP-EX-5

	Confirming understanding	A student explicitly says that s/he understands a particular topic or question.	S: "Yes, (I understood)"	CP-EX-6
	Confirming no understanding	A student explicitly says that s/he does not understand a particular topic or question.	"I didn't understand this."	CP-EX-7
	Trivial expressions.	Trivial expressions that indicate their follow up and cognitive engagement.	"Teacher, do we draw this [figure] on the textbook?"	CP-EX-8
Integration *Descriptor: Tentative (Convergent)*	Convergence among group members	Reference to previous utterance followed by substantiated agreement/ Repeating solutions proposed by other students/teacher with implied agreement		CP-IN-1
	Connecting ideas, synthesis	Integrating information from various sources - textbook, articles, personal experience	"These batteries, [which the teacher is showing] you find chemicals in them, like in chemistry"	CP-IN-2
	Creating solutions	Explicit characterization of utterance as a solution by participants	"[The answer is] False"	CP-IN-3
Resolution *Descriptor: Committed (Deductive)*	Various applications to real-world	implementation.		CP-RE-1
	Defending solutions	Defending why a problem is solved in a particular manner	S: "Teacher, [my answer is correct because] these are over voltage and the question requires us to identify lamps that are undervoltage"	CP-RE-2
	Reflection	Reflecting on learning content and outcome, learning processes, their responses on a task or assessment.	"My answers in the homework are correct!"	CP-RE-3

Note. Adapted from “Researching the community of inquiry framework: Review, issues, and future directions” by D. R. Garrison and J.B. Arbaugh, 2007, *The Internet and higher education*, *10*(3), p. 15-16.

Table 3

The Adapted Coding Scheme for SP

Category	**Indicators**	**Definition**	**Examples**	**Code**
Affective Expression	Expression of emotions	Conventional expressions of emotion	S: "I will get upset.” T: “You’re too close to me. COVID. I can’t tolerate this. And without a mask!”	SP-AF-1
	Use of humor	Teasing, cajoling, irony, understatements, sarcasm	S: “Baby Johnson, no tears after today” S: “hahaha” S: “what is this V-zone [pronouncing it like fuseau]?!”	SP-AF-2
	Self-disclosure	Presents details of life outside of class or expresses vulnerability (e.g., not doing their homework)	T: “Honestly, I didn’t find a motor at my home.” S: “I forgot to do the homework.”	SP-AF-3
Interactive Category (Open Communication)	Asking questions	Student asks questions of other students or teacher	S: “[Teacher], can you come here for a bit?”	SP-IN-1
	Complimenting, expressing appreciation, and acknowledging, others	Complimenting others or contents of others' utterances	“Bravo!” “Thank you!.” “Your handwriting is good.”	SP-IN-2
	Expressing agreement	Expressing agreement with others or content of others' utterances	"Ok.” “Yes”	SP-IN-3
	Managing turn taking	Responding to vocatives e.g., ‘yes’, ‘na3am’, ‘eh’, etc.		SP-IN-6

	Requesting permission to participate	Permission to solve an exercise, contribute to class discussion, write a response on the board, read a text from the physics textbook, etc.	"Can I solve the next part?"	SP-IN-4
	Requesting permission for non-academic activities	Permission to go to the restroom, borrow something, change seats, etc.	"Can I get my jacket from outside?"	SP-IN-5
	Classroom management	Students managing the learning environment	"It is Tala's turn now!" "The teacher is here, guys!"	SP-IN-7
	Technical issues and support (e.g., electricity cuts, calibration of the interactive board)	Talking about technical issues. Providing technical support by students to the teacher or other students.	"Click on the first button [of the remote control to turn on the interactive board]"	SP-IN-8
Group Cohesion	Addresses or refers to the group using inclusive pronouns	Addressing the group as we, us, our group	"Let's …" "We are talking about …"	SP-CO-1
	Phatic, Salutations	Communication that serves a purely social function; greetings, closures	"Good morning" "All is good?"	SP-CO-2
	Vocatives	Addressing or referring to participants by name	"Amer! where is Amer?, Amer?!"	SP-CO-3
	Sharing language, culture, and religion		"May God have mercy on your soul" "Thank God!"	SP-CO-4

Note. Adapted from "Assessing SP in Asynchronous Text-based Computer Conferencing" by L. Rourke, T. Anderson, D. R. Garrison, and W. Archer, 1999, *The Journal of Distance Education / Revue de l'ducation Distance, 14*(2), 50-71

Table 4

The Adapted Coding Scheme for TP

Category	**Indicators**	**Examples**	**Code**
Instructional Design and Organization	Setting curriculum	"We will start with chapter ..."	TP-ID-1
	Designing methods such as deciding: - whether students will be working individually or in groups. - how students can answer a question, orally while sitting in their desks or by writing/drawing on the board. - whether content should be written on the textbook or the copybook	"We will go by turn"	TP-ID-2
	Establishing time parameters	"Next week, we will have a quiz in this lesson"	TP-ID-3
	Establishing etiquette	"Calm down!" "Pay attention" "Have a seat please.".	TP-ID-4
	Responding to students' permission requests	"Yes. You can"	TP-ID-5
	Setting up and introducing instructional tools and materials	"Click on the pen. Look, it [the board] needs calibration"	TP-ID-6
	Setting up the space for learning, such turning on/off the light, closing windows/doors, asking about late to attend or absent students	"Open it [the window] a bit"	TD-ID-7
	Checking up on students' fulfilment of tasks	"Did you do the homework?"	TP-ID-8
	Providing directions for assessment	"The answers are on the question sheet on the space provided."	TP-ID-9
	Grading	"17 out of 20"	TP-ID-10
Facilitating Discourse	Identifying areas of agreement/disagreement		TP-FD-1
	Seeking to reach consensus/understanding	"No! No! No! She asked what is meant by mA"	TP-FD-2
	Encouraging. acknowledging. or reinforcing students' contributions,	"Continue. Omar, continue. In electricity [chapter] you have become off wire… Continue!"	TP-FD-3
	Drawing in participants prompting discussion	"Are you ready?" "What had we previously agreed on?"	TP-FD-4
	Assessing the efficacy of the process	"We are wasting our time"	TP-FD-5

Direct Instruction	Presenting content/questions	"What are the parts of a lamp?"	TP-DI-1
	Focusing the discussion on specific issues (including note taking)	"Take a note here …"	TP-DI-2
	Summarize the discussion	"Thus, insulators are materials that …"	TP-DI-3
	Confirming understanding through assessment and explanatory feedback, explicitly asking whether students understood a concept	"Ok?" "Do you understand?"	TP-DI-4
	Diagnosing misconceptions	"Voltameter is not the same as voltmeter! …"	TP-DI-5
	Injecting knowledge from diverse sources, e.g., textbook, articles, internet, personal experiences, real life examples	"Our buildings are not equipped with such a wire which is the ground wire. Thereby, what do we do to it? Elimination by using 3 to 2"	TP-DI-6
	Explaining terminology	" Consume means يستهلك"	TP-DI-7
	Scaffolding	"It (the rated voltage of the lamp) is printed on it"	TP-DI-8
	Specifying the language to be used	"English please"	TP-DI-9
	Teacher repeats		TP-DI-10
	Clarifying assessment prompts	"Here, you have to add connecting wires so that this lit off lamp does glowing. Ok?"	TP-DI-12
	Creating solutions (for the questions students pose or don't respond to).	S: "The indication that appears on a lamp is its _____ voltage". T (directly with no wait time): "It is rated voltage. Rated."	TP-DI-11

Note. Adapted from **"**Assessing TP in a computer conferencing context**"** by T**.** Anderson, R. Liam, D.R. Garrison, and W. Archer, 2001, *Journal of Asynchronous Learning Networks JALN, 5*(2), p. 6-10.

Implementing the CoI Framework. The adapted CoI framework was used to code and analyze the utterances spoken by the teacher and the students in the studied physics classroom. The following paragraphs provide a description of the chosen unit of analysis and the coding procedure.

Unit of Analysis. Rourke et al., (2000) and Garrison et al. (2001) recommend analyzing transcripts, in asynchronous teaching/learning, by coding at the message level. The rationale for choosing the message as a unit of analysis is that a message is objectively identifiable; its length and content are determined by the speaker rather than the coders. Additionally, the total number of cases produced at the message level is manageable. The corresponding application of this approach in the case of synchronous interaction is the "turn" because similar to the message, it is under the control of the speaker who determines its length and the content. Nevertheless, those researchers suggest that coding at the sub message level, though cumbersome, can be used if more precision is sought. Since the researcher in this study was interested in delineating the co-occurrence of language use with the actions of teaching, learning, or socializing at the level of the presence indicators, the researcher divided, whenever possible, each turn into utterances based on the function/action it conveyed. For example, if a student said, "Teacher, can I solve the next part?", the turn was divided into two utterances: 'Teacher' and 'can I solve the next part?'. The former utterance was coded, at the level of the indicator *vocatives* which falls under the *Group Cohesion* category of SP. The latter utterance was coded as *requesting permission to participate* that falls under the *Open Communication* category of SP.

However, in many cases, the same utterance was coded for indicators belonging to the same/distinct categories of the same presence (SP or TP) and/or different presences. For example, when the teacher said, 'turn it [the laptop and the active board] on so that we do some recall", this turn was divided into two utterances: ''turn it on" and "so that we do some recall". The former utterance was coded as setting up instructional tools which falls under the category of instructional design of the TP. The latter utterance was given two codes: 1) *addressing or referring to group using inclusive pronouns* indicator falling under the *Group Cohesion* category of the SP and 2) *setting the curriculum* indicator falling under the instructional design category of the TP. Consequently, coding at the level of indicators resulted in overlapped coding that occurred across the three presences, categories of the same presence type, and/or indicators of the same category of a presence.

Coding at the Level of the Indicator of Each Presence Type. The coding scheme of the CoI framework is hierarchical. It consists of categories corresponding to each type of presence and each category includes a set of indicators that help identify it. For example, SP comprises three categories*: Affective Expression*, *Interaction* or *Open Communication*, and *Group Cohesion*. To examine the existence and level of social interaction in a learning experience, coders searched for the indicators *of social interaction*, such as *asking questions*, *complimenting*, and *expressing agreement*. Thereby, given the hierarchical nature of the CoI scheme, the coders first identified the indicator reflected by each utterance, followed by the category and type of presence. The coders followed the detailed coding scheme for CP (Table 2), SP (Table 3), and TP (Table 4). The coders applied presence and category codes for each utterance. For example, CP-TE-1 corresponds to Cognitive Presence – Triggering Event – 1st indicator in the list.

The methodological issues articulated by Garrison, Cleveland-Innes, Koole, and Kappelman (2006) were attended to in the analysis of the transcripts. For instance, when two presences seemed equally expressed and coders could not agree on the most prominent category, both categories were recorded. In the case of CP, a few indicators might be common to two or more categories. To avoid confusion, Garrison et al., (2001) provided a descriptor for each category. For instance, the first category (*Triggering Event)* is described as the *evocative (inductive)* phase of the practical inquiry which is the means to create CP. The second category (*Exploration*) is described as *inquisitive (divergent)*, the third category (*Integration)* is described as tentative *(convergent)*, and the last category (*Resolution*) is described as the *committed (deductive)* phase of the practical inquiry model corresponding to the CP of the learners. Therefore, for categorical identification, the coders referred to the descriptor of each category.

Moreover, by coding at the utterance level, coders faced other issues in coding for the CP. For example, when the utterance is long it may include contradictory categorization cues or evidence of multiple phases (Garrison et al., 2001). As suggested by Garrison and colleagues, in case the existing categorization cues contradicted and did not clearly reflect a specific category, the coders coded down, i.e., to the lower phase of the practical inquiry cycle. Additionally, when an utterance included evidence of multiple phases of practical inquiry, the coders coded up, i.e., to the next phase since the higher levels of critical thinking (*Integration* and *Resolution*) borrow characteristics and processes from the previous phases (*Triggering event* and *Exploration*).

Along with coding for the three types of presence, the language varieties used by the students and the teacher in each class section were coded. The codes for language use were Arabic only, English only, French only, and mixed utterances (utterances uttered in more than one language, such as English and Arabic). Though rarely used, the French only code emerged during coding as a few students used some commonly used French words in the Lebanese culture, such as ‘bonjour’ and ‘merci’. Several times, the teacher used the article ‘the’ in students’ home language ‘ال’ denoting technical terms primarily at the beginning of his utterance (e.g., lampال). For example, *summarizing a* *discussion* about the definition of insulators, the teacher uttered, "The insulators are materials that do not permit the passage of electrical current". Though the use of Arabic here is minimal, such utterances were coded as mixed utterances. Additionally, some utterances weren't given language codes. These utterances mainly consisted of vocatives and laughs. For example, when the teacher's utterance (or whole turn) consisted only of a vocative, "Amer" for example, the utterance wasn't linguistically coded. Also, when a student laughed, "hahaha" the utterance wasn't coded linguistically. Consequently, the total number of language coded utterances was less than the total number of utterances uttered by the teacher and the students.

A qualitative analysis software, *NVivo*, was used in the coding procedure. The software facilitated the addition of a quantitative layer to the analysis. Frequencies were assigned to each indicator and category of the cognitive, social, and teaching presences in each class section. This contributed to the identification of co-occurrences between certain categories and indicators with the use of English only, Arabic only, French only, and mixed languages. The analysis of the co-occurrences, in turn, helped in identifying quantitative patterns in the use of Arabic with particular indicators and inferring the role that home language plays for the actualization of the cognitive, social and teaching presences. Excerpts from the verbatim transcripts were used to support the findings illuminated by the descriptive statistics.

Inter-rater Reliability. To ensure the reliability of the coding, inter-rater reliability was established by having a second coder independently code the speech in the video recorded sessions to identify the CoI indicators corresponding to the separated utterances and each presence category they correspond to. The second coder was a graduate research assistant pursuing a master's degree in science education with two years of teaching experience as an ESL and one year as IB-PYP homeroom teacher. The researcher trained the second coder for around two hours on the use of the CoI. She was provided with a transcript that constituted approximately 20% of the data. In the transcript the second coder was given, speakers' turns were divided into utterances. The second coder was asked to code each utterance at the level of the indicator. She wasn't asked to code for the speaker and the language since these two levels of coding are trivial. After the second coder independently coded the utterances and shared her results with the researcher. Then, the researcher shared her coding for the same transcript with the second coder to independently compare the coding, revise her codes, and highlight any disagreements. The percentage of agreement for the CoI coding at the level of the indicator was 98.22%.

Community of Inquiry Survey

The purpose of the survey was to provide the students and the teacher with an opportunity to evaluate the learning experience as understood from the lens of the CoI framework. Scores were assigned to the respondents' (students and the teacher) responses using a Likert scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). First, the average for each presence type was calculated. Second, the average score for all the survey items was calculated for each respondent. Third, the average for the class was calculated using students' responses. Finally, the teacher's averages of each presence type and of the whole survey were compared with the students' averages to illuminate any areas of alignment or unalignment and further explore the potential factors that may lead to these differences.

Semi-structured Interviews

One purpose of the interviews was to have a sense of whether the teacher's and students' responses to the interview questions were in alignment with their responses to the corresponding survey items. Hence, the researcher developed he interview questions (see APPENDIX E) from selected CoI survey items representing the categories of each presence type. Furthermore, questions regarding the attitudes toward the approach to language use in the physics class and attitudes towards TL in instruction were added to the interview questions.

In total, there were sixteen interview questions. Ten questions addressed the three presences. In general, each question targeted a category of one presence type. However, the *Open Communication* category was addressed by two inter-related questions. The only category that wasn't explicitly addressed by a question was the *Group Cohesion* category. The researcher assumed *Group Cohesion* indicators (*inclusive pronouns*, *vocatives,* and *shared culture, language, and religion*) could appear in the responses to any of the questions addressing the presence types and TL.

Six questions were also added to understand the interviewee's attitudes toward the language use approach and attitudes toward TL. Almost the same questions were asked to the students and the teacher. Table 5 shows the CoI-related interview questions for the students and the corresponding survey items of each presence category that engendered these questions. It is worth noting that the question addressing *Integration* appears to be more associated with the 25th item[4] which falls under *Exploration* and the 28th item[5] which falls under Integration simultaneously (see APPENDIX B). However,

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[4] I utilized a variety of information sources to explore problems posed in this course.
[5] Combining new information helped me answer questions raised in course activities.

the mapping of students’ responses was associated more with the 25th item for two main reasons: 1) it seemed to be a clear question for students to respond to reflecting on whether they integrate information from various sources to understand science topics; and 2) Akyol and Garrison (2008) assume that students’ increased use of diverse resources could imply an increase in the level of *Integration*.

Additionally, Table 5 shows the questions that addressed the teacher’s and students' attitudes toward the approach to language use and toward the use of TL in the studied classroom.

The audio-recorded interviews were fully transcribed by the researcher and thematically analyzed. The top-level themes were determined by the design of the interview questions which targeted the categories of each presence type. Hence, the presence types and the titles of categories were used as high level themes to organize what was shared by the teacher and the students. As for the lower level analysis of the utterances within each category, the researcher followed a bottom-up approach to identify themes. At this particular level of analysis, themes were identified inductively using the constant comparison method (Glaser & Strauss, 1967 as cited by Grove, 1988).

Triangulation of Data

In this study, a triangulation approach was adopted to maintain the credibility and validity of the findings. The two data sources, 1) the teacher’s and students’ perceptions of the learning environment based on their responses to the CoI survey, and 2) the teacher’s and students’ responses in semi-structured interviews were combined to develop a comprehensive understanding of the learning environment in the studied physics classroom.

Table 5

Matching Interview Questions with CoI Survey Items

Presence	Category	Addressed CoI Survey Item(s)	Interview Question for the Teacher	Interview Question for the Students
Cognitive Presence	Triggering Event	Problems posed in the physics classroom increased students’ interest in lesson issues.	Do you think students find physics classes you teach interesting? What in particular do you think interests them? How can you tell?	Do you find your physics lessons interesting? Can you give an example and explain why that was interesting?
	Exploration	Students felt motivated to explore lesson content-related questions in the physics class.	Do you think that problems/topics posed in the classroom motivate students to explore and engage in discussion about questions/problems posed in the physics classroom?	Do you feel motivated to explore and have engage in about questions/problems posed in the physics classroom?
	Integration	I utilized a variety of information sources to explore problems posed in this course. Combining new information (from various sources) helped me answer questions raised in course activities.	Do you think that students use multiple resources to understand physics topics? What sources do you think they use and how do they use them?	Do you use various resources to understand physics lessons? What do you do in case you didn’t understand a question or a topic? Do you use other resources to better understand a question or a topic?

	Resolution	Students can apply the knowledge created in this lesson non-class related activities (e.g., real-life activities outside school).	Do the physics lessons taught allow students to apply their learning outside the physics class, such as in another class or at home? How?	Were you able to apply any of your learning outside the physics class, such as in another class or at home? How?
Social Presence	Affective Expression	Getting to know their classmates gave students a sense of belonging in the class.	know other students in the class when then they are in the classroom? What are those opportunities?	Do you think you have the opportunity to get to know other students in the class when you are in the classroom? What are those opportunities?
	Open Communication	Students felt comfortable participating in the lesson discussions. Students felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	Do you feel that students are comfortable participating (and disagreeing) in lesson discussions?	Do you feel comfortable participating (and disagreeing with others) in lesson discussions?
Teaching Presence	Instructional Design	I clearly communicated important lesson goals. I clearly communicated important due dates/time frames for learning activities with the students.	What do you do to explain lessons, lesson goals and due dates clearly? How successful do you think you are?	How clearly does your physics teacher explain lessons? How clear is he in communicating the goals of a lesson and due dates of activities?
	Facilitating Discourse	I helped to keep students engaged and participating	Do you encourage students to participate in class discussions?	Does the teacher encourage you and other students to participate

	in productive dialogue.	Elaborate.	in the class discussion? Elaborate.
Direct Instruction	I provided feedback that helped students understand their strengths and weaknesses relative to the lesson's goals and objectives. I provided feedback to students in a timely fashion.	Do you provide feedback to your students in a reasonable time? Give an example of a time when you provided/didn't provide feedback to you and how did this affect students' learning?	Does the teacher provide feedback to you in a reasonable time? Give an example of a time when the teacher provided/didn't provide feedback to you and how did this affect your learning?

Table 6

Language-related Interview Questions

Teacher	Students
1. What is the school policy regarding the language of teaching and learning of science? How do you feel about that? 2. What language do you use in the classroom? What language(s) you're your students use? 3. How do you feel regarding the use of Arabic/English in the teaching and learning activities? 4. Do you feel that the use of TL impacted students' understanding and communication with you and with their classmates? How? 5. Do the other science teachers use /allow students to translanguage in their classes? Why? How do you feel about that? 6. Do you think it is right that English is used to teach science and not Arabic?	1. What language(s) does the physics teacher use in the classroom? What language(s) do you use? 2. How do you think this impacted your learning? 3. How did you feel regarding the use of TL (use of Arabic along with English) in the teaching and learning activities? 4. Do you feel that the use of TL impacted your understanding and communication with your classmates and teacher? How? 5. Do the other science teachers use /allow you to translanguage in the classroom? Why? How do you feel about that? 6. Do you think it is right that English only is used to teach science and not Arabic?

CHAPTER 4

RESULTS

The results of this study are presented in four sections, each addressing one of the four research questions. The first section targets the first research question where the results describe quantitatively and qualitatively the quality of the learning environment in a Lebanese middle school physics classroom as understood from the perspective of the Community of Inquiry (CoI) framework. The subsequent section addresses the second research question where the use of TL is analyzed in relation to the functions it serves. The third section presents the results of the CoI survey to illuminate the teacher's and learners' perception of the three types of presence. Finally, the fourth section elicits the attitudes of the teacher and the students toward the approach to language use in the physics classroom in addition to their attitudes toward the use of TL.

First Research Question: The Quality of Learning in a Lebanese Middle School Physics Classroom

The transcripts of the video recorded sessions were coded at three levels, type of presence, speaker, and language. The first two levels of coding helped address the first research question. Each speaker's turn was divided into utterances based on the action conveyed in each utterance. The total number of utterances coded in the seven sessions was 3891. The number of utterances corresponding to the teacher was 2062 and the number of utterances corresponding to the students was 1829. Many of these utterances conveyed indicators of categories of the same presence or different presences; consequently, the total number of instances of occurrence of the presences exceeded the total number of utterances.

The results of the coding at the level of the presences indicate that the three presences had different percentages of occurrence (Table 7). The total frequency of the instances of occurrence of the presences was 4547. Out of the total number of instances, 1828 (40%) instances corresponded to TP, 1497 instances (33%) corresponded to SP, and 1222 instances (27%) corresponded to CP.

TP dominated the learning environment, with *Direct Instruction* as the major activity performed by the teacher (21.82%), followed by *Instructional Design* (13.5%), and lastly *Facilitating Discourse* (4.88%). *Direct Instruction* was actually the category with the highest percentage of occurrence among the categories of the three presences.

The SP indicator categories also occurred with varying percentages. *Group Cohesion* dominated SP (21.05%) followed by *Open Communication* (7.54%). The least occurring category of SP was *Affective Expression* (4.33%) in the seven attended physics sessions.

As for CP, the four categories of indicators had a relatively low percentage of occurrence. *Exploration* occurred the most (9.9%) while *Resolution* occurred the least (1.56%). The two other categories of CP, *Triggering Event* and *Integration* had very close percentages of occurrence of 8.2% and 7.21% respectively.

To delve deeper into each presence, the subsequent subsections shed light on the categories and the indicators within each category.

Cognitive Presence

CP was the least occurring type of presence. Table 8 presents the frequencies and percentages of the instances of occurrence of the categories and indicators of CP. *Exploration* and *Triggering Event* categories dominated CP with 36.82% and 30.52%

percentage of occurrence respectively followed by *Integration* (26.84%) and *Resolution* was the least occurring category (5.81%).

Table 7

The Total Frequencies and Percentages of the Instances of Occurrence of Each Presence Type and Its Categories across the Seven Sessions.

Presence Type & Categories	**Frequency**	**Percentage (%)**
Cognitive Presence	1222	26.87
Triggering Event	373	8.20
Exploration	450	9.90
Integration	328	7.21
Resolution	71	1.56
Social Presence	1497	32.92
Affective Expression	197	4.33
Group Cohesion	957	21.05
Interaction	343	7.54
Teaching Presence	1828	40.20
Instructional Design	614	13.50
Facilitating Discourse	222	4.88
Direct Instruction	992	21.82
Total	4547	100.00

CP was mainly identified in students' utterances; however, there were instances when the teacher's utterances were coded either as *recognize a problem* or *new topic* under the *Triggering Event* category. This mainly occurred when the teacher read, translated, or explained a problem or a new idea from the textbook. The indicators within each category of CP are examined below.

Triggering Event. The high percentage of occurrence of the *Triggering Event* category (30.52%) was mainly due to the high level of occurrence of the indicator *recognize a problem* (21.11%), which had the highest percentage among all the other indicators of CP, followed by *new topic* (4.26%), and *sense of puzzlement* (5.16%).

Table 8

The Frequency and Percentage of the Instances of Occurrence of CP at the Level of Categories and Indicators Across the Seven Physics Sessions

CP Categories and Indicators	**Frequency**	**Percentage (%)**
Triggering Event	373	30.52
Recognize a problem	258	21.11
New topic (Reading from the textbook)	52	4.26
Sense of puzzlement	63	5.16
Exploration	450	36.82
Divergence within the community	30	2.45
Information exchange	171	13.99
Suggestions for consideration	53	4.34
Brainstorming	0	0.00
Student repeats	44	3.60
Student confirming no understanding	7	0.57
Student Confirming understanding	101	8.27
Trivial Expressions	44	3.60
Integration	328	26.84
Convergence among group members	69	5.65
Connecting ideas, synthesis	60	4.91
Creating solutions	199	16.28
Resolution	71	5.81
Various applications to real world	0	0.00
Defending solutions	3	0.25
Reflection	68	5.56
Total	1222	100.00

The first two indicators of *Triggering Event*, *recognize a problem* and *new topic*, were identified in both the teacher's and the students' utterances (Table 9). These two indicators were the only CP indicators identified in the teacher's utterances. All the other CP indicators were identified only in the students' utterances. Out of the 285 utterances coded as recognize a problem, *99 (38.37%) utterances were spoken by the teacher and 159 (61.63%) utterances were spoken by the students.* As for the 52 utterances coded as a *new* topic, 10 (19.23%) utterances were spoken by the teacher and 42 (100%) utterances were spoken by the students.

Table 9

The Total Frequency and Percentage of Instances of Triggering Event Indicators by Speaker

	Student		**Teacher**		**Total**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**
Triggering Event	264	70.78	109	29.22	383	100
Recognize a problem	159	61.63	99	38.37	258	100
New topic	42	80.77	10	19.23	52	100
Sense of puzzlement	63	100.00	0	0	63	100

Exploration. This category of CP had the highest percentage of occurrence (36.82%). The highest occurring indicator of this category was *information exchange* (13.99%) followed by *student confirming understanding* (8.27%). The two least occurring indicators were *divergence within community* (2.45%) and *confirming no understanding* (0.57%). Interestingly, there were no instances of *brainstorming* in the students' utterances in the seven recorded sessions.

Integration. This is the third highest occurring category of indicators of CP (26.84%) with *creating solutions* as the highest occurring indicator (16.28%) followed by *convergence among group members* (5.65%) and *creating solutions* (4.91%).

Resolution. This is the last and least occurring category of CP indicators (5.81). There were no instances where students did *various applications to the real world*. Only 0.25% of instances of CP indicators were coded as *defending solutions* and 5.52% of instances were coded as *reflection*.

Social Presence

Table 10 presents the total frequencies and percentages of occurrence of the indicators and categories of SP. *Group Cohesion* indicators dominated SP (63.93%), followed by *Open Communication* (22.91%), and lastly *Affective Expression* (13.16%).

Table 10

The Frequency and Percentage of the Instances of Occurrence of SP at the Level of Categories and Indicators Across the Seven Sessions

SP Categories and Indicators	**Freq**	**%**
Affective Expression	197	13.16
Expression of Emotions	91	6.08
Self-disclosure	54	3.61
Use of humor	52	3.47
Interaction (Open Communication)	343	22.91
Asking questions	91	6.08
Complimenting, expressing appreciation, and acknowledging others	12	0.80
Expressing agreement	23	1.54
Managing turn taking	39	2.61
Requesting permission to participate	44	2.94
Requesting permission for non-academic activities	10	0.67
Classroom management (by students)	90	6.01
Technical issues and support	34	2.27
Group Cohesion	957	63.93
Addressing/referring to the group using inclusive pronouns	291	19.44
Phatic, Salutations	19	1.27
Vocatives	622	41.55
Sharing language, culture, and religion	25	1.67
Total	1497	100

Group Cohesion. The use of *vocatives* and *addressing/referring to the group using inclusive pronouns* were the two most occurring indicators of *Group Cohesion* and SP. Approximately 41.55% of the instances of SP occurred in the form of *vocatives* and 19.44% occurred in the form of *inclusive pronouns.* The two other indicators of *Group Cohesion* occurred much less in the students' and teacher's interactions.

Approximately 1.67% of SP instances occurred in the form of *s*haring *language, culture, and religion* and approximately 1.27% appeared in the form of *phatic and salutations*.

Open Communication. This category had the biggest number of indicators under SP. The two indicators, *asking questions* and *classroom management* were the most occurring with a percentage of occurrence of around 6%. However, the other six indicators had less than a 3% percentage of occurrence.

Affective Expression. This was the least occurring category of SP indicators (13.16%). It was dominated by *Expression of emotions* (6.08%), followed by *self-disclosure* (3.61%), and finally the *use of humor* (3.47%).

Teaching Presence

Although, according to the CoI framework, TP can be evident in the teacher's and students' utterances, in this study, all the instances of TP belonged to the teacher. Table 11 presents the frequencies and percentage of instances of occurrence of the indicators of TP. The results indicate that the three categories of TP indicators occurred to varying extents. For instance, most of the teacher's actions (54.27%) fell under the category of *Direct Instruction*. Approximately 33.59% of the teacher's actions were related to *Instructional Design* and only 12.14% of his actions fell under the category of *Facilitating Discourse*.

Direct Instruction. This category of TP had the highest percentage of occurrence (54.27%) among the three categories, reflecting the didactic nature of instruction. The indicator that occurred the most in this category was *confirming understanding through assessment and feedback* (18.71%), followed by *presenting content or questions* (14.61%), *creating solutions* (5.53%), and *scaffolding (4.05%)*.

The remaining indicators had low percentages of occurrence ranging from 2.35% to 0.71% with *summarizing discussion* as the least occurring indicator.

Table 11

The Frequency and Percentage of the Instances of Occurrence of TP at the Level of Categories and Indicators in the Seven Physics Sessions.

TP Categories and Indicators	**Frequency**	**Percentage (%)**
Instructional design	614	33.59
Setting curriculum	51	2.79
Designing methods	157	8.59
Establishing time parameters	21	1.15
Establishing etiquette	114	6.24
Responding to students' permission requests	45	2.46
Setting up/ introducing instructional tools	50	2.74
Setting up the space for learning	41	2.24
Checking up on students' fulfilment of tasks	79	4.32
Providing directions for assessment	28	1.53
Grading	28	1.53
Facilitating Discourse	222	12.14
Identifying areas of agreement or disagreement	0	0.00
Seeking to reach consensus or understanding	17	0.93
Encouraging. acknowledging. or reinforcing students’ contributions	43	2.35
Drawing in participants	108	5.91
Assessing the efficacy of the process	54	2.95
Direct Instruction	992	54.27
Presenting content or questions	267	14.61
Focusing the discussion on specific issues	26	1.42
Summarizing the discussion	13	0.71
Confirming understanding through assessment and explanatory feedback	342	18.71
Diagnosing misconceptions	27	1.48
Injecting knowledge from diverse sources	29	1.59
Explaining terminology	18	0.98
Scaffolding	74	4.05
Specifying the language to be used	19	1.04
Teacher repeats (what he has already said)	43	2.35
Clarifying assessment prompts	33	1.81
Creating solutions	101	5.53
Total	1828	100.00

Instructional Design. Under this category, the indicator *designing methods* had the highest percentage of occurrence (8.59%) followed by *establishing etiquette* (6.24%) and *checking up on students' fulfillment of tasks* (4.32%). The other indicators of *Instructional Design* had a low percentage of occurrence. For example, s*etting curriculum* and *setting up instructional tools* had around 3% percentage of occurrence each. *Responding to students' permission requests, setting up the space for learning*, *providing directions for assessment*, and *grading* constituted around 2% of SP each. The least occurring *Instructional Design* action was *establishing time parameters* (1.15%).

Facilitating Discourse. As for the *Facilitating Discourse* category, *drawing in participants* was the most occurring action (5.91%), followed by *assessing the efficacy of the process* (2.95%), *encouraging, acknowledging, and reinforcing students' contributions* (2.35%), and *seeking to reach consensus* (0.93%). The indicator *identifying areas of agreement or disagreement* didn't appear in the teacher's actions, eliciting the teacher's focus on knowledge transfer in one direction, from the teacher to the student.

Second Research Question: The Role of Translanguaging in Enacting the Cognitive, Social, and Teaching Presences

Languages Used in the Classroom

The participating students and teacher spontaneously translanguaged (i.e., used a mixture of different languages) in their interactions. The total number of utterances spoken by both the teacher and the students was 3891. However, only 3758 of these utterances were given language codes. 133 utterances weren't given language codes because these utterances didn't convey a specific language. For example, when a teacher's utterance only included a vocative, such as a student name, "Mariam", the utterance wasn't given a language code. Also, when a student's utterance was simply a laugh, "hahaha", the utterance wasn't given a language code. Therefore, the number of utterances coded for language was less than the total number of utterances.

Table 12 shows the distribution of utterances over the different languages used in the classroom by speaker. The highest percentage of the utterances were in English only (39.12%), followed by Arabic only (35.52%), mixed utterances (25.23%), and finally French only (0.13%). Students most frequently used Arabic only (43.45%) followed by English only (39.65%), mixed utterances (16.63%), and lastly French only (0.28%). Meanwhile, the teacher used English only (38.62%), Arabic only (28.12%), and mixed languages (25.23%) fairly evenly. The teacher and the students used English only almost equally. However, the teacher used less Arabic (28.12%) and more mixed utterances (33.26%). Unlike the students, the teacher didn't use any French terms in his speech.

Table 12

The Distribution of the Teacher's and Students' Utterances Over the Different Languages Used in the Classroom.

Language	**Arabic**		**English**		**French**		**Mixed**		**Total**	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Student	789	43.45	720	39.65	5	0.28	302	16.63	1816	100
Teacher	546	28.12	750	38.62	0	0.00	646	33.26	1942	100
Total	1335	35.52	1470	39.12	5	0.13	948	25.23	3758	100

Languages Used Across the Three Presences

It is important to recall that some utterances were coded for more than one presence or for more than one indicator of the same presence type. The examined frequency of instances of a presence produced in a particular language may exceed

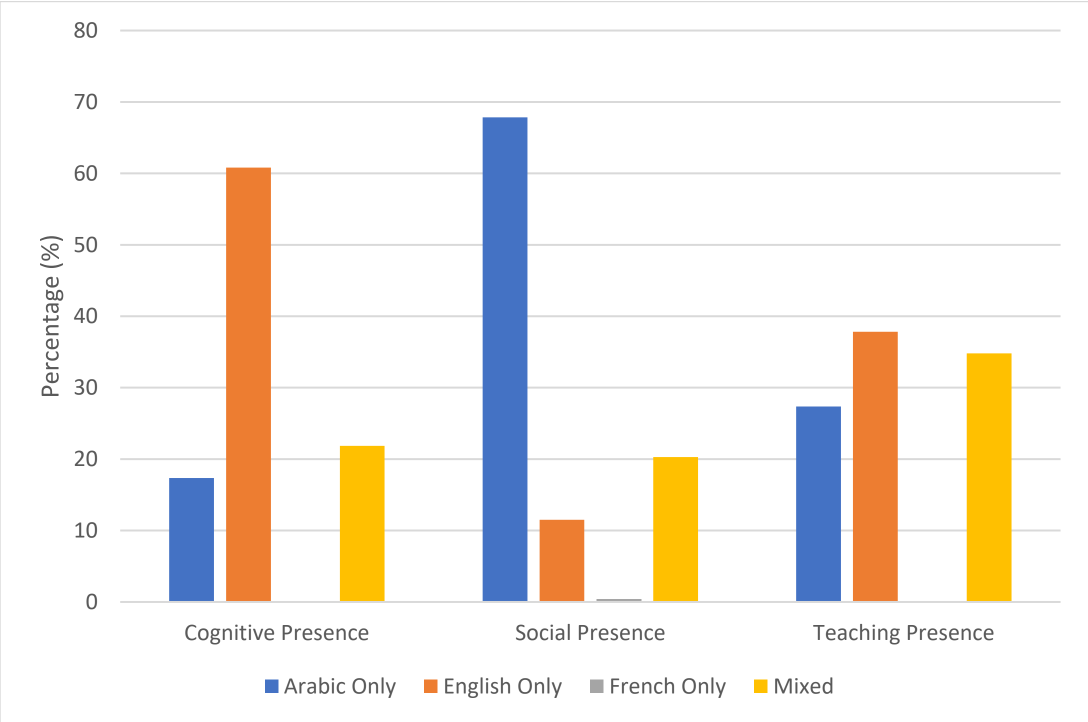
3891, the total number of utterances spoken by the teacher and the students. Additionally, since some utterances weren't given language code (e.g., vocatives, or laughs), the frequency of instances of language(s) use for some presences might be less than the total frequency of occurrence of the indicator/presence. The only presence type that had the number of utterances equal to the number of language codes and equal to the sum of instances of occurrence of the indicators was CP. The methodological instructions for CP necessitate that no two indicators of the presence be given to the same utterance (Garrison et al., 2001). If two indicators were thought to exist in an utterance, the coders either coded down or up as described in the methodology chapter in accordance with the suggestions of Garrison et al. (2001).

Figure 3 presents the distribution of the languages used over the different presences. The results indicate that Arabic only, English only, and a mix of both languages were used spontaneously by the participants (teachers and students).

CP, SP, and TP appeared to follow different pattern of language use. CP, for instance, was dominated by the use of English only (60.80%), followed by a mix of languages within the same utterance (21.85%), and Arabic only (17.35%). In contrast, SP was dominated by the use of Arabic only (67.84%) followed by a mix of Arabic and English (20.29%), English only (11.50%), and French (0.37%). However, since the frequency of utterances articulated in French only were trivial and constituted less than 0.5% of all the language-coded utterances, they will not be a part of the forthcoming tabulations. As for the TP, an even distribution of utterances across languages was observed: 37.83% English only, 34.81% mixed, and 27.36% Arabic only.

Figure 3

The Distribution of the Different Languages Used Over the Different Presences



A 3X3 Chi Square test was conducted to examine whether there was a significant relationship between language (English only, Arabic only, Mixed) and presence type (Cognitive, Social, Teaching). The relationship was found to be significant ($\chi 2$ = 1476.382; *df* = 6; p < 0.0001) showing that languages were used differently across utterances dealing with the different presences (Table 13).

The identification of differences in the use of languages in across the utterances motivated us to look in more detail at how languages were distributed over the different categories and indicators within each presence type. In the subsequent paragraphs, we examine how languages (Arabic only, English only, Mixed) were used across the categories and indicators of CP, SP, and TP and whether there was a significant relationship between language use and the categories of each presence type.

Table 13

Chi-Square Test for the Language by Presence

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	1476.382[a]	6	0.000
Likelihood Ratio	1509.071	6	0.000
N of Valid Cases	4345		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 1.18.

Cognitive Presence. CP was dominated by the use of English only followed by mixed utterances and finally Arabic only, as indicated above. Yet, this pattern was not repeated for all the categories and the indicators of CP (Table 14). For instance, as explained in more depth below, the first three categories *Triggering Event*, *Exploration*, and *Integration* were dominated by English only. However, the fourth category, *Resolution*, was dominated by the use of Arabic only (3.27%) followed by mixed utterances (2.37%), and finally English only (0.16%). The predominance of English only in CP utterances, particularly *recognize a problem* and *creating solutions* indicators suggests that the use of English only was mainly restricted to read or written text. The utterances coded as *Exploration* uttered in English only were mainly phrases with technical terms (e.g., “rated voltage”; “fades?”) rather than full sentences spontaneously shared by the students during whole class work. What follows is a detailed analysis of language use at the level of each category of CP.

Triggering Event. Approximately 30.52% of CP occurred in the form of *Triggering Events*. The two indicators *recognize a problem* and *new topic* occurred mainly in English only with 16.69% and 3.93% percentages of occurrence, respectively, followed by mixed and lastly Arabic only. However, there were no instances where a *new topic* was spoken in Arabic only. Students expressed a *sense of puzzlement* more frequently in Arabic only (2.54%) followed by mixed utterances (2.29%) and finally English only (0.33%).

Exploration. Approximately 36.82% of CP occurred in the form of *Exploration*. English only was the more frequent language option used with most of the indicators in this category of CP. For example, *information exchange* which was the most occurring indicator of this category occurred mainly in English only (7.69%) followed by mixed utterances (3.85%) and Arabic only (2.45%). However, the indicator *suggestions for consideration* occurred almost equally in Arabic only (1.47%), English only (1.47%), and mixed utterances (1.39%). Notably, students tended to *confirm no understanding* and share *trivial expressions* mostly in Arabic only.

Integration. This category constituted approximately 26.84% of CP. Students mainly engaged in *knowledge integration* in English only (19.31%) followed by mixed language-coded utterances (5.56%) and finally Arabic only (1.96%). This pattern was observed also in the indicators of this category. *Convergence among group members*, *connecting ideas*, and *creating solutions* were all dominated by English only followed by mixed utterances and Arabic only.

Resolution. This was the least occurring category of CP (5.81%) and the only one that was dominated by the use of Arabic only (3.27%) followed by mixed utterances (2.37%) and English only (0.16%). During the seven attended sessions, there were only 3 instances (0.25%) where students defended their solutions, 2 in mixed language-coded utterances and 1 in Arabic only. *Reflection on the learning process and content* appeared 68 times and constituted approximately 5.56% of SP. Most of the utterances conveying reflection were spoken in Arabic only (3.19%) followed by mixed languages (2.21%), and lastly English only (0.16%).

Table 14

The Distribution of the Language-Coded Instances of CP Across the Indicators of CP

CP Categories and Indicators	**Arabic**		**English**		**Mixed**		**Total**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Triggering event	37	3.03	256	20.95	80	6.55	373	30.52
Recognize a problem	6	0.49	204	16.69	48	3.93	258	21.11
Sense of puzzlement	31	2.54	4	0.33	28	2.29	63	5.16
New topic	0	0.00	48	3.93	4	0.33	52	4.26
Exploration	111	9.08	249	20.38	90	7.36	450	36.82
Divergence within the community	9	0.74	11	0.90	10	0.82	30	2.45
Information exchange	30	2.45	94	7.69	47	3.85	171	13.99
Suggestions for consideration	18	1.47	18	1.47	17	1.39	53	4.34
Brainstorming	0	0.00	0	0.00	0	0.00	0	0.00
Student repeats	1	0.08	40	3.27	3	0.25	44	3.60
Student Confirming understanding	14	1.15	81	6.63	6	0.49	101	8.27
Student Confirming no understanding	7	0.57	0	0.00	0	0.00	7	0.57
Trivial Expressions	32	2.62	5	0.41	7	0.57	44	3.60
Integration	24	1.96	236	19.31	68	5.56	328	26.84
Convergence - among group members	4	0.33	59	4.83	6	0.49	69	5.65
Connecting ideas, synthesis	10	0.82	27	2.21	23	1.88	60	4.91
Creating solutions	10	0.82	150	12.27	39	3.19	199	16.28
Resolution	40	3.27	2	0.16	29	2.37	71	5.81
Various applications to real world	0	0.00	0	0.00	0	0.00	0	0.00
Defending solutions	1	0.08	0	0.00	2	0.16	3	0.25
Reflection	39	3.19	2	0.16	27	2.21	68	5.56
Total	212	17.35	743	60.80	267	21.85	1222	100

A 4X3 Chi Square test was conducted to examine whether there was a significant relationship between language (English only, Arabic only, Mixed) and the categories of CP (Triggering Event, Exploration, Integration, Resolution). The relationship was found to be significant ($\chi 2$ = 171.585; *df* = 6; p < 0.0001) showing that Arabic only, English only, and the mix of those two languages were used differently across utterances dealing with the different categories of CP (Table 15).

Table 15

Chi Square Test for CP Categories and Languages Used

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	171.585[a]	6	0.000
Likelihood Ratio	182.084	6	0.000
N of Valid Cases	1222		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.32.

Social Presence. Table 16 shows the distribution of language-coded utterances across the indicators of SP. The global pattern of language use in SP was Arabic only (68.09%), followed by mixed utterances (20.37%), and English only (11.54%) as the least used language. The three categories of SP followed the same pattern of language use though this pattern was not consistent across all the indicators. However, regardless of the pattern of variations across indicators, all the indicators of SP (except for one) were dominated by Arabic only. The only indicator not dominated by the use of Arabic only was *addressing/referring to the group using inclusive pronouns* which was dominated by the use of a mix of Arabic and English (9.12%).

Table 16

The Distribution of Language-Coded Instances of SP Across the Indicators of SP

SP Categories and Indicators	Arabic Only		English Only		Mixed		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Affective Expression	142	10.44	11	0.81	32	2.35	186	13.60
Expression of Emotions	73	5.37	10	0.74	7	0.51	90	6.62
Self-disclosure	41	3.01	0	0.00	14	1.03	55	4.04
Use of humor	28	2.06	1	0.07	11	0.81	41	2.94
Open Communication	253	18.60	42	3.09	43	3.16	342	24.85
Asking questions	72	5.29	6	0.44	12	0.88	90	6.62
Complimenting, expressing appreciation, acknowledging others	6	0.44	0	0.00	2	0.15	12	0.59
Expressing agreement	11	0.81	11	0.81	1	0.07	23	1.69
Managing turn taking	31	2.28	6	0.44	2	0.15	39	2.87
Requesting permission for non-academic activities	9	0.66	0	0.00	1	0.07	10	0.74
Requesting permission to participate	37	2.72	4	0.29	3	0.22	44	3.24
Classroom management (students)	61	4.49	14	1.03	15	1.10	90	6.62
Technical issues and support	26	1.91	1	0.07	7	0.51	34	2.50
Group Cohesion	531	39.04	104	7.65	202	14.85	837	61.54
Addressing/referring to the group using inclusive pronouns	103	7.57	61	4.49	124	9.12	288	21.18
Phatic, Salutations	7	0.51	6	0.44	5	0.37	18	1.32
Vocatives	400	29.41	37	2.72	69	5.07	506	37.21
Sharing language, culture, and religion	21	1.54	0	0.00	4	0.29	25	1.84
SP	926	68.09	157	11.54	277	20.37	1360	100.00

Affective Expression. Approximately 13.6% of language-coded instances of SP belonged to the *Affective Expression* category. This category followed the global pattern of language use for enacting SP. It was dominated by Arabic only (10.44%) followed by mixed languages (2.35%), and English only (0.81%). The language used for the two indicators *use of humor* and *self-disclosure* also followed the global pattern, unlike the indicator *expressions of emotions,* which was dominated by Arabic only (5.37%), followed by English only (0.74%), and finally a mix of both languages (0.51%).

Open Communication. Around 25% of the language-coded instances of SP belonged to the *Open Communication* category which was dominated by Arabic only (18.6%) followed by mixed languages (3.16%), and English only (3.09%). Five indicators out of eight followed the same pattern of language use. *Managing turn taking* and *requesting permission to participate* occurred mainly in Arabic only, followed by mixed utterances, and finally English only. *Expressing agreement* occurred equally in Arabic only and English only (0.81%) followed by mixed languages (0.07%). Though not included in the tabulations, it is noteworthy to mention that French only was only evident in students' utterances coded as *complimenting, expressing appreciation, and acknowledging others*.

Group Cohesion. Approximately 61.54% of SP was articulated in the form of *Group Cohesion*. Similar to the two previously mentioned categories of SP, students and the teacher mainly expressed their cohesion using Arabic only (38.04%) followed by a mix of Arabic and English (14.85%), and English only (7.65%). All the indicators in this category followed the global pattern of language use for SP except for *phatic and salutations* which were mainly expressed in Arabic only (0.51%) followed by English only (0.44%), and mixed languages (0.37%).

A 3X4 Chi Square test was conducted to examine whether there was a significant relationship between language (English only, Arabic only, Mixed) and the categories of SP (*Affective Expression, Open Communication, Group Cohesion*). The relationship was found to be significant ($\chi 2$ = 38.307; *df* = 6; p < 0.0001) showing that languages were used differently across utterances dealing with the different categories of SP (Table 17).

Table 17

Chi Square Test for SP Categories and Language Used

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	38.307[a]	6	0.000
Likelihood Ratio	41.447	6	0.000
N of Valid Cases	1365		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is .68.

Teaching Presence. Table 18 shows the distribution of utterances spoken in Arabic only, English only, or a mix of those two languages across the indicators of TP. The teacher used Arabic only, English only, and mixed utterances fairly evenly. Approximately 37.83% of TP was enacted in English only followed by 34.81% mixed utterances, and 27.36% Arabic only. The categories *Instructional Design* and *Facilitating Discourse* were dominated by Arabic only while *Direct Instruction* was dominated by English only with more subtle variations across the indicators.

Table 18

The Distribution of Language-Coded Instances of TP Across the Indicators of TP

TP Categories and Indicators	Arabic Only		English Only		Mixed		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Instructional design	276	15.70	132	7.51	151	8.59	559	31.80
Setting curriculum	6	0.34	25	1.42	20	1.14	51	0.37
Designing methods	48	2.73	37	2.10	39	2.22	124	2.77
Establishing time parameters	12	0.68	1	0.06	8	0.46	21	0.69
Establishing etiquette	73	4.15	20	1.14	10	0.57	103	4.17
Responding to students' permission requests	18	1.02	19	1.08	6	0.34	43	1.04
Setting up/introducing instructional tools and materials	25	1.42	3	0.17	21	1.19	49	1.44
Setting up the space for learning	27	1.54	8	0.46	4	0.23	39	1.54
Checking up on students' fulfilment of tasks	40	2.28	7	0.40	32	1.82	79	2.30
Providing directions for assessment	15	0.85	8	0.46	5	0.28	28	0.86
Grading	12	0.68	4	0.23	6	0.34	22	0.69
Facilitating Discourse	108	6.14	58	3.30	55	3.13	221	12.57
Identifying areas of agreement or disagreement	0	0.00	0	0.00	0	0.00	0	0.00
Seeking to reach consensus or understanding	7	0.40	6	0.34	4	0.23	17	0.97
Encouraging, acknowledging, reinforcing students’ contributions	18	1.02	10	0.57	14	0.80	42	2.39
Drawing in participants	46	2.62	33	1.88	28	1.59	107	6.09
Assessing the efficacy of the process	37	2.10	9	0.51	9	0.51	55	3.13
Direct Instruction	97	5.52	475	27.02	406	23.09	978	55.63
Presenting content or questions	18	1.02	102	5.80	145	8.25	265	15.07
Focusing the discussion on specific issues (including note taking)	7	0.40	7	0.40	12	0.68	26	1.48
Summarizing the discussion	0	0.00	3	0.17	10	0.57	13	0.74
Confirming understanding through assessment and explanatory feedback	48	2.73	204	11.60	85	4.84	337	19.17

Diagnosing misconceptions	1	0.06	1	0.06	25	1.42	27	1.54
Injecting knowledge from diverse sources	3	0.17	2	0.11	23	1.31	28	1.59
Explaining terminology	0	0.00	8	0.46	10	0.57	18	1.02
Scaffolding	7	0.40	33	1.88	34	1.93	74	4.21
Specifying the language to be used	1	0.06	15	0.85	3	0.17	19	1.08
Teacher repeats	2	0.11	35	1.99	6	0.34	43	2.45
Clarifying assessment prompts	8	0.46	5	0.28	14	0.80	27	1.54
Creating solutions (for the questions students pose/don’t respond to)	2	0.11	60	3.41	39	2.22	101	5.75
TP	481	27.36	665	37.83	612	34.81	1758	100.00

Instructional Design. All the teacher's utterances conveying *Instructional Design* actions occurred mainly in Arabic only except for *setting curriculum* and *responding to permission requests* which were dominated by English only. *Designing methods,* which was the most occurring indicator of this category was verbalized by the teacher fairly evenly in the three language varieties: 2.73% in Arabic only, 2.10% in English only, and 2.22% in a mix of the two languages.

Facilitating Discourse. All the teacher's actions falling under this category were spoken in Arabic only. Surprisingly, there were no instances where the teacher identified areas of agreement or disagreement among students.

Direct Instruction. The teacher's *Direct Instruction* actions were dominated by English only or mixed language-coded utterances. It was observed that the teacher mainly used English only when synthesizing final written products (i.e., solutions to problems) and when uttering short factual and communicative utterances. For instance, when c*onfirming understanding,* the teacher mainly provided brief unexplanatory feedback, such as "Ok?" and "Correct". When *specifying the language to be used (i.e., English),* the teacher was observed to model the use of English, "in English please". Also, when *creating solutions* for posed problems and repeating those solutions (i.e., *teacher repeats* indicator*),* the teacher primarily spoke in English only.

Further, the teacher was observed to use mixed utterances in *Direct instruction* when facilitating conceptual development. He was observed to explain concepts using students' home language but use discipline-specific terms in English when *presenting content and questions, focusing discussion, diagnosing misconceptions, injecting knowledge from diverse sources, explaining terminology, scaffolding,* and *clarifying assessment prompts.* However, there were several instances where the teacher (and the students) used the article ‘the’ in Arabic ‘ال’ to denote objects or technical terms in his English phrases (e.g., “<u>The</u> motor of the elevator. They don’t mean the generator”) Though the use of Arabic in those utterances is minimal, those utterances were coded as mixed utterances. Notably, when *summarizing discussion*, the teacher used mixed utterances, but he often started the summary with the Arabic marker ‘فإذاً: (therefore)’ and continued in English only (e.g., “<u>Therefore,</u> an open switch acts as insulator. An open switch acts as an insulator. A closed switch acts as a conductor”). The dominance of the use of English in English only utterances and mixed utterances in *Direct Instruction* actions could elicit the teacher’s adherence to the language-in-education school policy despite his salient agentive resistance to the policy.

A 3X4 Chi Square test was conducted to examine whether there was a significant relationship between language (English only, Arabic only, Mixed) and the categories of SP (*Instructional Design, Facilitating Discourse, Direct Instruction*). The relationship was found to be significant ($\chi 2$ = 341.280; *df* = 6; p < 0.0001) showing that languages were used differently across utterances dealing with the different categories of TP (Table 19).

Table 19

Chi Square Test for TP Categories and Languages Used

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	341.280[a]	6	0.000
Likelihood Ratio	354.351	6	0.000
N of Valid Cases	1758		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 60.47.

Languages Used at the Level of the Three Presence Types by the Teacher and the Students. Figure 4 segregates the percentage of the language-coded utterances by the speaker, teacher, and students, across the three types of presence.

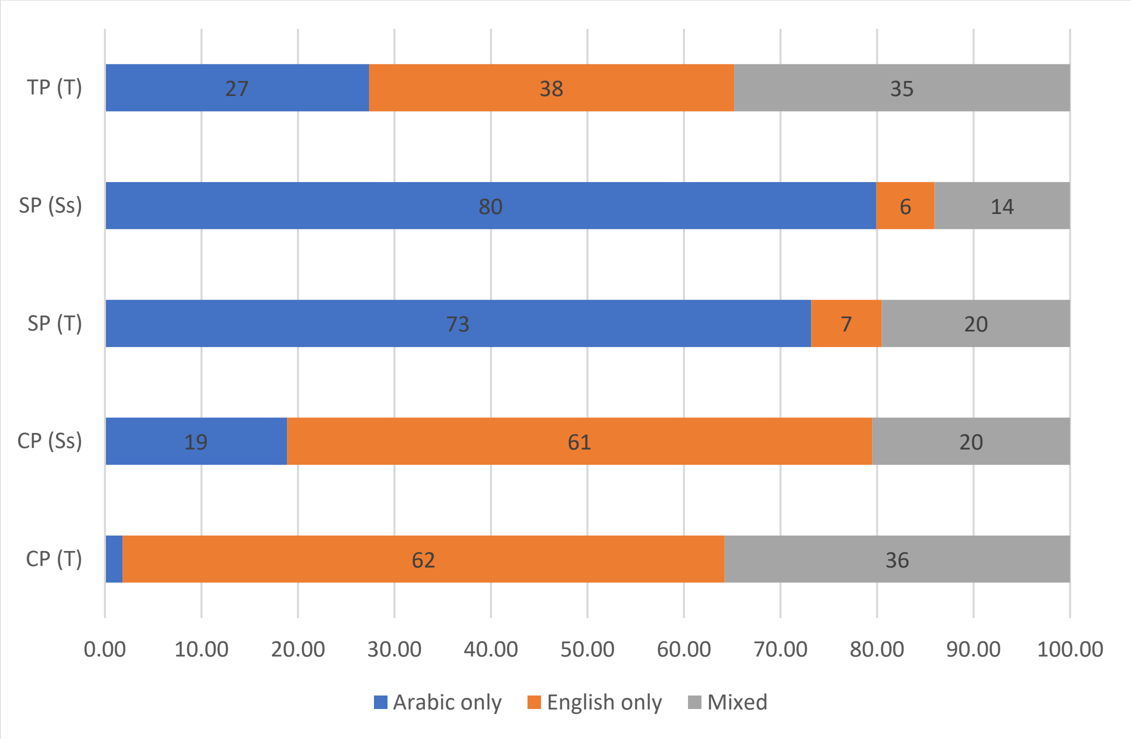
Teaching Presence. Only the teacher's utterances were coded for TP. As mentioned above, less variations in the percentage of language use were observed in the TP. The teacher fairly evenly used Arabic only (27%), English only (38%), and a mix of those two languages (35%).

Social Presence. This type of presence was evident in both the teacher's and the students' utterances though it occurred much more in the students' utterances. The pattern of language use by the teacher on the one hand and the students on another hand followed the global pattern of language use for SP. Both the teacher and the students used mainly Arabic only to enact their SP followed by a mix of Arabic and English and finally English only.

Cognitive Presence. The only two indicators of CP that were evident in both, the teacher's and students' utterances were *new topic* and *recognizing a problem*. Hence, the language results for the teacher utterance coded as CP refer only to the *Triggering Event* category. Similar to SP, the teacher's and students' use of language followed the global pattern of language use for CP. Both predominantly used English only to enact CP followed by mixed utterances and finally Arabic only.

Figure 4

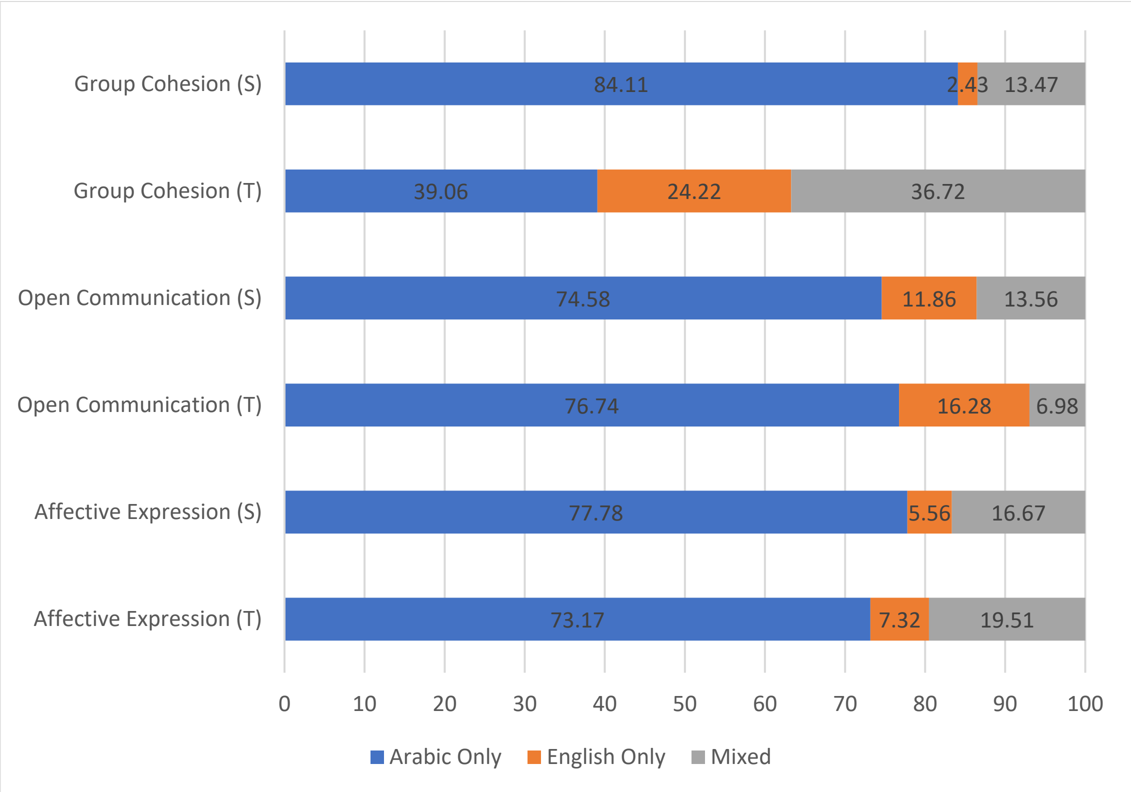
The Distribution of Utterances Over the Different Languages Used by the Teacher and the Students for each Presence



A Closer Look at the Languages Used by the Teacher and Students at the Level of Social Presence Indicators. Figure 5 visualizes the percentage of the utterances spoken in Arabic only, English only, or a mix of those two languages by the teacher and the students to enact their SP at the level of categories. Utterances coded as *Open Communication* or *Affective Expression* for both the teacher and the students were dominated by Arabic only. However, much less Arabic was evident in the teacher's utterances enacting *Group Cohesion* (39.06%) compared to the students (84.11%).

Figure 5

Distribution of Language-Coded Utterances Uttered Across the Speakers at the Level of Social Presence Categories



A closer look at the social interactions of the teacher and the students is depicted in Table 20. It shows the percentage of the utterances spoken in Arabic only, English only, or mixed utterances by the teacher and the students to enact their SP. As mentioned above, all SP interactions were mainly articulated in Arabic only by the teacher and the students at the level of categories, but some variations existed at the level of indicators when the utterances were segregated by speakers.

Affective Expression. Both the teacher and the students mostly used Arabic only to express their emotions. Students talked about emotions (3.81%) more than the teacher did (1.54%). They also felt more comfortable expressing their vulnerability and life outside school (self-disclosure) using Arabic followed by mixed languages but never in English only. Students also joked more than the teacher, mainly in Arabic only and mixed languages but never in English. Yet, one student used French only (0.07%) when joking around his classmate's drawing. One student was copying a figure of a lamp from the assessment sheet to the board and two of his classmates were joking. One of them commented, "look, what a lamp!", and the other said laughing, "lampadaire!".

Open Communication. Both the teacher and the students engaged in *Open Communication* mainly in Arabic only followed by mixed utterances and English only. Interestingly, the indicators *requesting permission for non-academic activities* and c*omplimenting, expressing appreciation, acknowledging others* weren't expressed in English at all. They were mainly expressed in Arabic only and mixed utterances. Also, *managing turn taking* only appeared in students' utterances when they were using Arabic only, but it appeared in Arabic only, English only, and mixed utterances in the teacher's utterances.

Group Cohesion. The teacher mainly addressed students using collective pronouns in mixed utterances (7.18%) followed by English only (3.96%) and finally Arabic only (3.22%). On the contrary, students mainly referred to the group in Arabic only (4.32%) followed by mixed utterances (1.9%), and English only (0.51%). Notably, the indicator *sharing language, culture, and religion* only occurred in Arabic only for the teacher (0.37%) and in Arabic only (1.17%) and mixed utterances (0.29%) for the students.

Table 20

The Distribution of Language-Coded Utterances Uttered by the Teacher and the Students Across the Indicators of Social Presence

SP Categories and Indicators	Arabic Only		English Only		French Only		Mixed		Total
	T	S	T	S	T	S	T	S	
Affective Expression	2.20	8.21	0.22	0.59	0.00	0.07	0.59	1.76	13.63
Expression of Emotions	1.54	3.81	0.15	0.59	0.00	0.00	0.29	0.22	6.59
Self-disclosure	0.44	2.56	0.00	0.00	0.00	0.00	0.29	0.73	4.03
Use of humor	0.22	1.83	0.07	0.00	0.00	0.07	0.00	0.81	3.00
Open Communication	2.42	16.12	0.51	2.56	0.00	0.29	0.22	2.93	25.05
Asking questions	0.00	5.27	0.00	0.44	0.00	0.00	0.00	0.88	6.59
Complimenting, expressing appreciation, acknowledging, others	0.15	0.29	0.00	0.00	0.00	0.29	0.00	0.15	0.88
Expressing agreement	0.22	0.59	0.07	0.73	0.00	0.00	0.07	0.00	1.68
Managing turn taking	1.90	0.37	0.44	0.00	0.00	0.00	0.15	0.00	2.86
Requesting permission for non-academic activities	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.07	0.73
Requesting permission to participate	0.00	2.71	0.00	0.29	0.00	0.00	0.00	0.22	3.22
Classroom management (students)	0.00	4.47	0.00	1.03	0.00	0.00	0.00	1.10	6.59
Technical issues and support	0.15	1.76	0.00	0.07	0.00	0.00	0.00	0.51	2.49
Group Cohesion	10.99	27.91	6.81	0.81	0.00	0.00	10.33	4.47	61.32
Addressing/referring to the group using inclusive pronouns	3.22	4.32	3.96	0.51	0.00	0.00	7.18	1.90	21.10
Phatic, Salutations	0.15	0.37	0.22	0.22	0.00	0.00	0.00	0.37	1.32
Vocatives	7.25	22.05	2.64	0.07	0.00	0.00	3.15	1.90	37.07
Sharing language, culture, and religion	0.37	1.17	0.00	0.00	0.00	0.00	0.00	0.29	1.83
Social Presence	15.60	52.23	7.55	3.96	0.00	0.37	11.14	9.16	100.00

The Influence of High Stakes Learning Environment on Cognitive Presence and Language Use

Since CP is assumed to be the ultimate goal of the learning environment, this study zoomed into how languages were used to enact CP in each session at the level of categories and at the level of the CP indicators in the fourth session, the session during which students underwent a written summative assessment. Students' interactions and language use seemed impacted by the high stakes environment. Table 21 provides a brief description of each session.

Table 21

Description of the Learning Activities in Each Physics Session

Date	**Session**	**Description**
March 16	1	- Oral formative assessment of chapter 10, *Electric Circuit*: The teacher recited some definition and labels for the symbols of the electric circuit. - Checking up who did/didn't do their homework. - Whole group correction of homework: The teacher led the whole class correction of homework. Students participated by turn assigned by the teacher. - Assigning homework for the next session
March 17	2	- Checking up who did/didn't do the homework. - Whole group correction of homework: The teacher led the whole class correction of homework. Students participated by turn assigned by the teacher. - Assigning a quiz for next week.
March 23	3	- No electricity all day– the teacher set the classroom for learning, i.e., he searched for markers and asked students to turn their desks to the right to face the white board. - Correction of homework: the teacher continued the whole class correction of the homework. - Questions about the assessment: Students asked the teacher questions about the quiz (content-related questions, - Starting with chapter 11, *Electric Measurements*: the teacher read the lesson objective from the book, wrote the explanation of the new chapter on the board and students copied onto their physics copybooks.

March 24	4	- 20-minute quiz. - Setting up the classroom for learning: the Arabic teacher borrowed the class laptop because the one at her class wasn't functioning. Hence, the physics teacher had to use the white board and have students turn their desks to face the white board. - Whole class quiz correction: The teacher led the quiz correction. Students copied the answers from the white board onto their copybooks.
March 30	5	- Distribution of the corrected quiz sheets - Explanation of chapter 11: the teacher demonstrated the use of a multimeter with some lamps and batteries. Then, he shared a prompt on the board and engaged students in solving the prompt. The prompt was a direct application of the so far explained ideas of the chapter.
March 31	6	- Whole group classwork: solving textbook exercises. - 5-minute small groupwork (Exercise 8) - Assigning homework for next week
April 7	7	- Whole group correction of HW. - Setting up the date for a summative assessment directly after the Spring vacation. (This was the last session before the Spring vacation.)

Table 22 shows the frequency and percentage of the instances of occurrence of the CP indicators in each session. The major findings are summarized below at the level of *Triggering Event*, *Exploration*, and *Resolution* categories.

Triggering Event. At the level of the *Triggering Event* indicators, *sense of puzzlement* occurred the most in the 4th session when students were undergoing assessment (16.39%).

Exploration. Students engaged in this phase of CP to the greatest extent in the 3rd session, where they were engaged in solving exercises required for the assessment that was performed the day after. Though students engaged less in this phase in the 4th session, an interesting finding was that there were only 7 instances in which *students confirmed no understanding* in total, in the seven sessions, and 5 of these instances occurred in the 4th session. Thus, showing how a high stakes environment impacted students' CP.

Resolution. This category occurred the most in the 4th session where students engaged in 47 instances of *Resolution*, constituting approximately 25.68% of the total instances of CP. In the first three sessions students were mainly engaged in whole group homework correction, this category had a very low percentage of occurrence of 0.55%, 0.53%, and 1.59% respectively. In the 5th session, particularly when students received their graded quizzes, they reflected on their results and understanding of the quiz questions, answers, and mistakes, the percentage of *Resolution* instances was 7.19%. However, the percentage decreased to 4.62% in the 6th session where the teacher was introducing new chapter topics and to zero in the 7th session where students were solving direct application exercises from the textbook.

Table 22

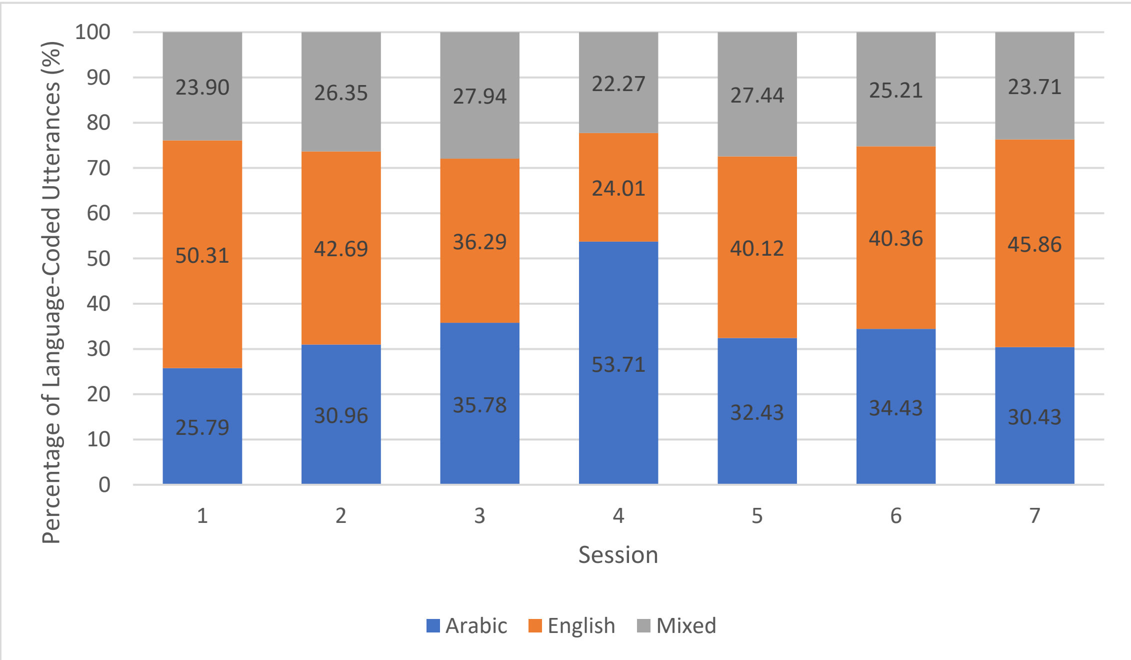
The Frequency and Percentage of the Instances of Occurrence of the CP Indicators Across the Seven Sessions

	1st Session		**2nd Session**		**3rd Session**		**4th Session**		**5th Session**		**6th Session**		**7th Session**		**Total**	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Triggering Event	47	25.68	67	35.45	33	17.46	56	30.60	50	35.97	65	33.33	55	38.19	373	30.52
Recognize a problem	39	21.31	62	32.80	25	13.23	26	14.21	12	8.63	42	21.54	52	36.11	258	21.11
Sense of puzzlement	8	4.37	5	2.65	6	3.17	30	16.39	10	7.19	1	0.51	3	2.08	63	5.16
New topic (Reading from the book)	0	0.00	0	0.00	2	1.06	0	0.00	28	20.14	22	11.28	0	0.00	52	4.26
Exploration	83	45.36	43	22.75	120	63.49	41	22.40	47	33.81	71	36.41	45	31.25	450	36.82
Divergence - within the community	2	1.09	4	2.12	9	4.76	5	2.73	2	1.44	5	2.56	3	2.08	30	2.45
Information exchange	43	23.50	14	7.41	41	21.69	5	2.73	20	14.39	20	10.26	28	19.44	171	13.99
Suggestions for consideration	12	6.56	6	3.17	7	3.70	7	3.83	4	2.88	13	6.67	4	2.78	53	4.34
Brainstorming	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Student repeats	7	3.83	1	0.53	12	6.35	6	3.28	4	2.88	12	6.15	2	1.39	44	3.60
Student Confirming understanding	16	8.74	13	6.88	31	16.40	9	4.92	16	11.51	14	7.18	2	1.39	101	8.27
Student Confirming no understanding	0	0.00	0	0.00	0	0.00	5	2.73	0	0.00	2	1.03	0	0.00	7	0.57
Trivial Expressions	3	1.64	5	2.65	20	10.58	4	2.19	1	0.72	5	2.56	6	4.17	44	3.60
Integration	52	28.42	78	41.27	33	17.46	39	21.31	32	23.02	50	25.64	44	30.56	328	26.84
Connecting ideas, synthesis	0	0.00	0	0.00	12	6.35	5	2.73	12	8.63	21	10.77	10	6.94	60	4.91
Convergence - among group members	20	10.93	7	3.70	5	2.65	8	4.37	10	7.19	9	4.62	10	6.94	69	5.65
Creating solutions	32	17.49	71	37.57	16	8.47	26	14.21	10	7.19	20	10.26	24	16.67	199	16.28
Resolution	1	0.55	1	0.53	3	1.59	47	25.68	10	7.19	9	4.62	0	0.00	71	5.81
Various applications to real world	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Defending solutions	1	0.55	0	0.00	0	0.00	2	1.09	0	0.00	0	0.00	0	0.00	3	0.25
Reflection	0	0.00	1	0.53	3	1.59	45	24.59	10	7.19	9	4.62	0	0.00	68	5.56

Figure 6 presents the percentage of the utterances spoken in English only, Arabic only, or a mix of both languages in each session. English only dominated the classroom discourse in all the sessions, except in the 4th session, followed by Arabic only, mixed languages. In the 4th session, Arabic only dominated the classroom discourse (53.71%) followed by English only (24.01%), and mixed utterances (22.27%).

Figure 6

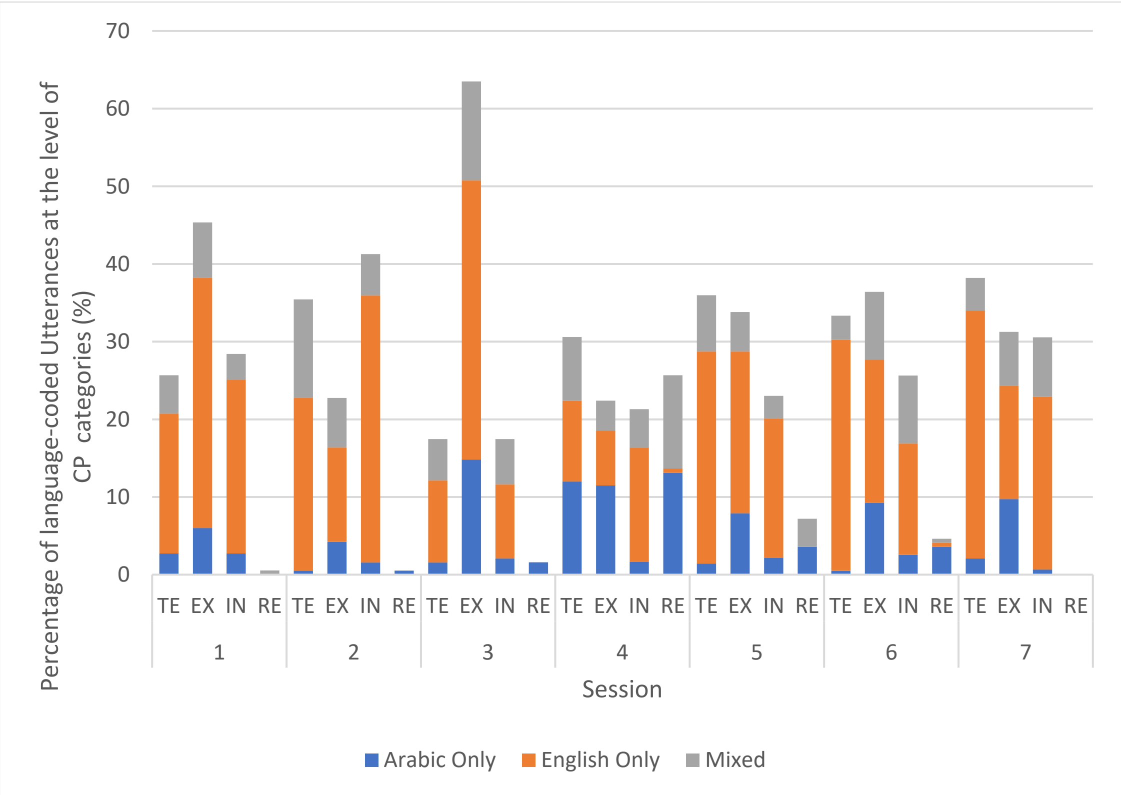
The Distribution of Utterances Over the Different Languages Across the Seven Sessions



Delving deeper into CP, Figure 7 depicts the language(s) of the utterances conveying CP action in each of the seven video recorded physics sessions. Unlike the other sessions where *Triggering Event* utterances were dominated by English only, in the 4th session, utterances *Triggering Event* utterances were dominated by Arabic only (12.02%). Similarly, while most of the utterances conveying *Exploration* were spoken in English only in all the sessions, they were dominated by Arabic only (11.48%) in the 4th session. However, similar to the other sessions, utterances of *Integration* were dominated by English only (14.75%). Finally, in utterance coded as *Resolution*, students mainly used Arabic only (13.11%) followed by mixed languages (12.02%) and English only (0.55%).

Figure 7

The Distribution of Utterances Over the Used Languages at the Level of CP Categories in Each Session



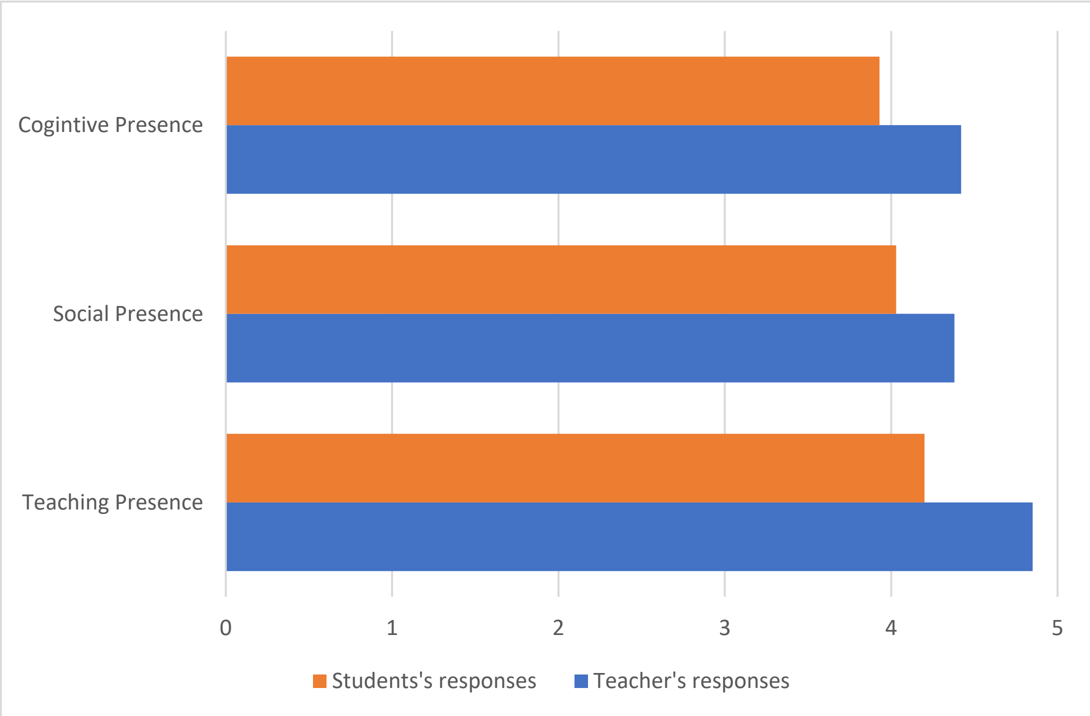
Third Research Question: Teacher's and Students' Perception of the Learning Environment from a CoI Perspective

Results of the CoI Survey

The teacher and students responded to the CoI survey items using a Likert scale from 1 (Strongly disagree) to 5 (Strongly agree). Concerning students' responses, an average score was calculated for each item by dividing the sum of each item scores over the number of respondents – i.e., 10 students in this case – which resulted in decimal average scores. The results of the CoI survey are displayed in Figure 8. Students' responses to the survey were in alignment with the results of the transcript coding of the seven video recorded sessions using the adapted CoI framework. Students perceived that TP played a significant role in the learning environment (4.20) followed by SP (4.03) and CP (3.93).

Figure 8

The Teacher's and Students' Responses to the CoI Survey



On the other hand, the teacher's responses indicate that he was more aware than the students (4.85) of the dominance of the TP in the learning environment. However, he presumed that CP (4.42) and SP (4.38) were almost equally enacted in his class. Additionally, he provided higher scores for SP and CP than the students, assuming he provided opportunities for enacting these two types of presence.

A detailed view of the teacher's and the students' average responses to the individual survey items is provided in Table 23. Following is an analysis of the CoI survey results for each presence type.

Teaching Presence. The teacher's self-evaluation of his TP was quite high (4.85 out of 5). He scored all items as 5 except for items 10 and 11 which he scored as 4. Students also provided high score for teacher's TP (4.2). They believed the teacher clearly communicated important lesson goals, topics, and activity instructions. They also assumed that the teacher provided feedback that supported their understanding in timely fashion. They mostly agreed that the teacher was helpful in guiding them toward understanding lesson topics in a way that helped them clarify their thinking (4.7) while keeping them on track for learning (4.6). However, some discrepancies mainly emerged in items 4, 7, and 10. While the teacher strongly agreed (5) that he clearly communicated important due dates/time frames for learning activities and kept students engaged in productive dialogue, students scored these two items as 3.8 and 3.7 respectively. The low score for the latter item could suggest time constraints or a classroom culture focused on having a single correct answer. Notably, both the students and the teacher scored the item, 'my actions reinformed the development of a sense of community among students' the least, 3.6 and 4, respectively.

Social Presence. In general, the teacher and the students shared similar views on SP with closely aligned scores on most items. For instance, they both agreed that the classroom was an excellent space for social interaction and rated this survey item 4.2 and 4, respectively. They also agreed that they were able to form distinct impressions of some of their classmates and felt comfortable participating in lesson discussions and interacting with each other. However, some differences emerged, notably in items 20 and 21. While the teacher presumed students were equally comfortable interacting and disagreeing with each other while still maintaining a sense of trust (4), students felt less comfortable disagreeing with each other (3.7). Yet, the most significant disparity between the teacher's and students' perception of SP surfaced in the last two items. The teacher believed that students felt their point of view was acknowledged by their classmates (5) while students rated this survey item 3.7 out of 5. This disparity could elicit a classroom culture that overemphasis a single correct answer which students mainly communicate with the teacher rather than their classmates. The average score of students on this item could also elicit group dynamics in which a few individuals dominate the discussion while others exhibit low confidence, fearing rejection or ridicule if they express their opinions. Moreover, the teacher strongly agreed that classroom discussion helped students develop a sense of collaboration while, students, rated this statement 3.7 out of 5 eliciting the focus on individual work rather than group work in the physics classroom.

Cognitive Presence. Overall, both the teacher and the students perceived CP relatively positively though the teacher provided a slightly higher score (4.42) than students (3.93). They both scored relatively high (between 4 and 5) on items 22, 23, 24, 28, 29, and 30, thus suggesting that physics lesson topics and problems piqued students' interest and motivated them to learn and explore content-related questions. However, both provided low scores for items 25 (utilizing a variety of information sources), 31 (describing ways to test and apply knowledge), 32 (developing applicable solutions), and 33 (applying constructed knowledge). Items 25 and 33 in particular had the lowest scores. The teacher and the students expressed a neutral stance regarding the students' ability to apply the knowledge constructed in the physics classroom in activities outside the classroom; thus, shedding light on the quality of the Lebanese curriculum and the disconnection between school physics and students' everyday life. Furthermore, there were some discrepancies between the teacher's and students' responses. A significant discrepancy between the teacher and the students exists in their responses to item 27. The teacher strongly agreed that classroom discussions were valuable in helping students appreciate different perspectives while students scored this item as 3.9, thus supporting the previous findings.

Table 23

The Teacher's and Students' Responses to the CoI Survey

Survey Item	Responses: Teacher	Responses: Students (Average)
Teaching Presence Items	4.85	4.20
1. I clearly communicated important lesson topics	5	4.4
2. I clearly communicated important lesson goals.	5	4.2
3. I provided clear instructions on how students can participate in lesson learning activities.	5	4.2
4. I clearly communicated important due dates/time frames for learning activities with the students.	5	3.8
5. I was helpful in identifying areas of agreement and disagreement on lesson topics that helped students learn.	5	4.2
6. I was helpful in guiding the students towards understanding lesson topics in a way that helped them clarify their thinking.	5	4.7
7. I helped to keep students engaged and participating in productive dialogue.	5	3.7
8. I helped keep the students on task in a way that helped them to learn.	5	4.6
9. I encouraged students to explore new concepts in the physics lessons.	5	4.3
10. My actions reinforced the development of a sense of community among students.	4	3.6
11. I helped to focus class discussions on lesson-relevant issues in a way that helped the students to learn.	4	4.1

12. I provided feedback that helped students understand their strengths and weaknesses relative to the lesson's goals and objectives.	5	4.3
13. I provided feedback to students in a timely fashion.	5	4.5
Social Presence Items	4.38	4.03
14. Getting to know their classmates gave students a sense of belonging in the class.	5	4.2
15. Students were able to form distinct impressions of some of their classmates.	4	4.1
16. Classroom communication is an excellent medium for social interaction.	4	4.2
17. Students felt comfortable participating in the lesson discussions. in the physics class.	4	4.2
18. Students felt comfortable interacting with other students in the physics class.	4	4.4
19. Students felt comfortable disagreeing with their classmates about physics-related topics while still maintaining a sense of trust in each other.	4	3.7
20. Students felt that their point of view was acknowledged by their classmates in the physics class.	5	3.7
21. Classroom discussions help students to develop a sense of collaboration.	5	3.7
Cognitive Presence Items	4.42	3.93
22. Problems posed in the physics classroom increased students' interest in lessons issues.	5	4.1
23. Physics lesson activities piqued (triggered) students' curiosity to learn more.	5	4.4
24. Students felt motivated to explore lesson content-related questions in the physics class.	5	4.3
25. Students utilized a variety of information sources to explore the problems posed in physics lessons.	3	3.2
26. Brainstorming and finding relevant information helped students resolve content-related questions.	5	4.1
27. Classroom discussions were valuable in helping students appreciate different perspectives.	5	3.9
28. Combining new information helped students answer questions raised in lessons activities.	4	4

29. Physics learning activities helped students construct explanations/solutions.	5	4
30. Reflection on lesson content and discussions helped students understand fundamental concepts.	5	4.2
31. Students can describe ways to test and apply the knowledge created in the physics lessons.	4	3.6
32. Students have developed solutions to physics problems that can be applied in practice.	4	3.8
33. Students can apply the knowledge created in this lesson in non-class related activities.	3	3.5

Results from the Interview

Interviews were conducted with the teacher and four students, Jana, Asma, Amer, and Maria (pseudonyms). The students were selected for interview because they had different views about the quality of the learning environment-i.e., varying scores for the CoI survey: high score (Jana), average score (Asma), low score (Maria), and remarkable variation in evaluating the three presences in the survey (Amer). Table 24

Students' Scores in the CoI Survey shows the scores for the four students and includes a brief description of students' interactions in the classroom. It is noteworthy to mention that when the interviews were conducted, both the researcher and the interviewees translanguaged spontaneously, however the data presented from the interviews is reported completely in English using English translations from the Arabic when needed.

Table 24

Students' Scores in the CoI Survey

Student	**Description**	**Average Score**			
		CP	**SP**	**TP**	**Overall**
Jana	She was reserved yet remarkably engaged in and actively contributing to class discussions.	4.62	4.43	4.92	4.70
Asma	She was a very active and vocal participant. Many times, the teacher asked her to calm down, step back, and create space for others to participate. She stuttered while talking but her excitement in the physics class encourages her to talk fast, loud, and participate a lot.	3.69	4	4	3.88
Amer	He preferred to sit in the last row in class. He was quiet and only participated when the teacher assigned him a role or a task.	3.15	4.29	4	3.73
Maria	She had social anxiety yet knowing her classmates since 5^{th} grade allowed her to establish a sense of belonging and feel comfortable to participate. However, she	3.31	3.86	3.62	3.55

	expressed discontent with the content of the textbook and the posed problems.

The transcribed audio recorded interviews were thematically analyzed. The audio-recorded interviews were fully transcribed by the researcher and thematically analyzed. Since the interview questions were derived from particular CoI survey items each representing a category of a presence type, the presence type and titles of categories were used as top-level themes to organize the interviewees' responses. However, for the lower level of analysis, the researcher adopted a bottom-up approach, identifying themes inductively using the constant comparison method (Glaser & Strauss, 1967 as cited by Grove, 1988). Through this thematic analysis, themes within each presence category were identified. The results of the interview analysis for the teacher and the students at the level of each presence category are provided in the subsections below in addition to a contrast between the participants' responses to the interview questions and the relevant CoI survey items to determine if there was alignment between them. A detailed mapping between the participants' responses to the interview questions and the corresponding CoI survey items is presented in APPENDIX F.

Cognitive Presence. The following paragraph summarize the findings from the interviews relevant to cognitive presence.

Triggering Event. The primary triggering events in the studied physics class were the physics problems presented to the students by the teacher which were often problems supplied by the textbook in addition to the new topics also provided by the textbook. Students' responses uncovered three main themes here. The first theme was *interest/lack of interest in physics problems.* Three out of the four interviewed students believed that the physics problems were interesting, though Amer expressed his lack of interest in physics as a subject and his preference for life sciences over physical sciences. The second theme was *quality of the physics problems.* Maria, for instance, thought the physics problems were direct applications that were disconnected from everyday life and did not stimulate her deep thinking. The third theme was critique *of the physics textbook.* Similar to Maria, Amer critiqued the physics textbook, "I honestly don't like it. It [includes] exercises only [direct applications]. It doesn't tell us how we can benefit from the exercises. I am interested in knowing how much effort a person [inventor] exerts to invent the thing [we are studying]. We see this thing [invention] and we think that it is just like any other thing, but maybe this person struggled for more than ten years to make it… I wish it [the textbook] included information about the inventor of the thing we are learning about, why he invented it, what his goal was, and why."

In general, students' responses and scores were in alignment. For example, Jana who rated the relevant CoI survey item (item 22) as 5, posited that she found physics problems interesting because she liked physics as a subject. Maria and Asma scored this item as 4 and were explicit about their interest, yet Maria wished to have more compelling problems in the textbook and class to deepen her knowledge. Amer, who scored item 4 had mixed stances in the interview, though, he didn't feel inclined to physics topics and problems and physical sciences in general, he still found physics "beautiful".

As for the teacher, emphasizing the physics topics and problems provided by the textbook as the triggering events, three themes were identified. First, the teacher commented on *the degree of students' interest in the studied physics topics and topic-*

relevant problems, noting that some topics were more interesting than others and served as triggers for some students more than others. For instance, Amer exhibited more interest in physics when the teacher started with the unit on electricity. Amer's increased participation and seeking of other resources (e.g., YouTube videos) were evidence for the teacher's claim. The second theme was *cultural stereotyping.* The teacher assumed that in the past, physics topics and problems, such as electricity and mechanics, were mainly "boys' topics". However, given the resources shortage people have been experiencing in Lebanon (e.g., electric outages, extremely high prices of gas and oil, the need for generators, etc.), such physics topics have become of interest for both boys and girls. The third theme was related to the *impact of COVID-19 on students' interest in physics topics*. The teacher felt students' interest in physics topics might have been diminished as a result of curriculum reduction evoked by COVID-19. He assumed curriculum reduction impacted students' level of preparedness, which in turn impacted their interest. Given the gap in students' knowledge, they weren't as interested in physics topics and problems as he would have assumed they would be. For instance, he said his students lacked basic mathematical knowledge and skills about equations and proportions that could enable them to use the formula velocity = distance/time: "more than half of the class couldn't derive the formula for the time!", he said.

Furthermore, the teacher's response to the interview question about triggering events was in alignment with his response to item 22 in the survey. He strongly agreed that the problems posed in the physics classroom increased students' interest in lesson issues and in the interview, he was positively sure as well, "Yes, of course! Especially when we start with electricity".

Exploration. *Exploration* is the 2nd phase of CP in which students are expected to engage in to explore potential solutions to a problem. Three themes emerged from students' responses regarding their motivation to explore lesson content-related questions in the physics classroom. The first theme was *interest in topic.* Maria, Jana, and Asma felt motivated to explore lesson content-related questions. Meanwhile, Amer hedged "maybe" when asked about whether he felt motivated to explore physics topics. The second theme was *teacher's approach to explaining content.* Maria and Asma, for instance, assumed that the teacher's approach to explaining and simplifying content was at the heart of their motivation. Asma also related her motivation to her interest in the physics topic itself. The third theme was about the *quality of the questions and the textbook*. Amer, for example, linked his hesitation to the poor quality of the physics textbook which included surface-level problems lacking historical and practical context. Providing a historical context to the questions and the topics (e.g., how, why, and by whom a particular invention was invented) and clarifying the purpose of the questions in relation to everyday life (e.g., how can he benefit from content) and how he could benefit from physics questions in everyday life, he assumed, could increase his motivation to explore.

In general, the themes that emerged in student interviews were in alignment with their responses to the corresponding survey item except for Maria. Jana, and Asma had high scores for item 24 (scored 4 and 5 respectively) and both of them responded, "Yes, a lot!" in the interview. However, Asma's score was lower most probably because she linked her motivation to her interest in the topics being studied. Amer had a neutral stance on this survey item and hedged in the interview and he connected the status of his motivation to the quality of the questions framed in the textbook as mentioned earlier. As for Jana, some discrepancy was noted between her responses. Though she said she felt motivated to explore physics questions in the classroom, she had a neutral stance on item 24. However, her elaboration overly emphasized the teacher's approach to explaining and simplifying content as the source of motivation rather than intrinsic appeal to physics content itself.

On the other hand, two themes emerged in the teacher's interview: *students' motivation to explore physics problems* and *motivation constraints*. The teacher was certain that students felt motivated to explore physics questions, despite some constraints – i.e., limitations of the curriculum and students' capacity. He thought that the 7th-grade Lebanese national physics curriculum touched upon the surface of phenomena and didn't provide opportunities for students to delve deeper. Nevertheless, he also assumed students, who only started studying for the first year in that year have limited capacity to understand compelling physics topics. This claim could be related to his earlier assumption about students having a gap in knowledge as a result of curriculum reduction during the time of COVID. Consequently, he commented, "I think the curriculum is deep enough for them at this stage".

The teacher's response in the interview aligned with his response to item 24 in the survey. He strongly agreed that students felt motivated to explore physics questions in his class and in the interview, he exhibited certainty, "Yes. Sure. Sure" despite the shallowness of the physics curriculum.

Integration. One form of knowledge integration is combining information from various sources. Akyol and Garrison (2008) assume that *Integration* could be a consequence to exploring various resources. When asked about whether they used various resources to understand physics topics, students had varying responses which uncovered two main themes*: interest-driven learning* and the *teacher as the source of knowledge*. Amer said he seldom used external resources, yet he watched a few videos about electricity and the invention of the lamp. However, since he watched those videos prior to studying the unit on electricity he assumed this use of external resources was interest-driven rather than evoked by the physics class itself. Additionally, Amer and three other students said that the teacher would be their primary source of information in case they were challenged by a topic or question though they could refer to other resources to varying degrees.

Comparing students' responses in the interviews to their responses to the relevant CoI survey item, there appears to be some alignment. Amer, for instance, rated the survey item as 1 (strongly disagree) though he said he referred to YouTube, though rarely, to learn about what intrigues him, However, for him, this was self-learning and exploration that preceded the physics lesson and hence was not evoked by physics class per se. Asma and Maria, for instance, rated the corresponding survey item as 3 indicating their moderate agreement, thus aligning with their occasional use of external resources as they commented in the interview. Meanwhile, Jana strongly agreed that she used various resources to understand physics lessons, such as the teacher, her brother, YouTube, and the textbook, especially when she encountered a challenging question or a topic.

Nonetheless, the teacher linked the use of various resources to two factors: *students' interest in the topic* and *school's financial resources*. For instance, two students, including Amer, discussed with him some videos they watched on YouTube about electricity, a topic they exhibited interest in. The teacher also emphasized the enrichment some resources (e.g., laboratory materials, virtual labs, and Colorado simulations) could add to the lessons if the school had the needed financial resources.

In the survey, the teacher had a neutral stance on item 25 (scored as 3) which resonates with his response in the interview.

Resolution. A representative indicator of *Resolution* is the application of knowledge to the real world. Students' responses to the relevant question included two main themes: *perspectives on the applicability of physics knowledge outside the classroom* and *constraints to application*. Asma and Maria assumed that physics knowledge could sometimes be applied, yet they didn't elaborate on their understanding of knowledge application. Asma linked knowledge application to the availability to materials; not having the materials mentioned in the textbook or used by the teacher limited her knowledge application. On the other hand, Jana and Amer perceived applications differently. They thought about knowledge application as understanding the world: understanding how the fan switch functions every time she turns it on/off, knowing how much voltage a lamp needs to function, and being aware that some physics lessons overlap with chemistry lessons.

Comparing responses, there is a high level of alignment between the survey and the interview data. Jana, for instance, strongly agreed that physics knowledge could be applied in real world and was able to provide several examples of how she was able to apply her knowledge to understand the world around her. Maria and Asma score the relevant survey items 3 and 2 respectively which matched their emphasis on the constraints to the application of physics knowledge. Finally, Amer who shared the same view with Jana, could only recall a single instance of physics knowledge application.

He exhibited discontent with the disconnection between school physics and everyday life both in the interview and his strong disagreement to the relevant survey item.

Conversely, the teacher was very sure of his claim that students could apply the acquired in-school physics knowledge outside the classroom. He provided several examples in which physics could be applied in daily life, such as the positioning of batteries in the television remote control. Nevertheless, the teacher critiqued the broadness of the Lebanese curriculum, “I am teaching the spirit of physics rather than physics itself”. He assumed the physics curriculum triggered broad surface learning instead of deep understanding.

However, the teacher’s response in the interview didn’t align with his response to the relevant CoI survey item. The teacher had a neutral stance on the statement ‘Students can apply the knowledge created in this lesson non-class related activities’, yet in the interview he expressed certainty that students could apply their knowledge outside the classroom. This discrepancy could relate to the teacher’s earlier claim about the shallowness of the physics curriculum and lack of resources at school that could help him demonstrate various applications of abstract concepts.

Social Presence. The following paragraphs summarize the themes related to social presence that emerged in the teacher’s and students’ responses to the interview questions.

Affective Expression. To address this category of SP, students were asked whether they thought they had the opportunity to get to know their colleagues and to describe these opportunities that would most probably induce their *Affective Expression*. Three main themes were identified in students’ responses: *familiarity with each other, group work,* and *physics class is not a space for socializing*. First, all the interviewed students underscored the fact that they had known each other since 5th grade. The long-term relationships made them feel a sense of belonging in the physics classroom. Second, Amer shed light on group work as an opportunity for him to get to know his classmates, though the physics teacher only conducted group work once during the whole year. Third, Asma notably assumed that physics class should be a space for learning rather than socializing. This perspective of Asma could have engendered from her hard work in physics and emphasis on getting high grades as was observed in the physics sessions.

There was good alignment between students' perspectives shared in the interviews and their responses to item 14 in the survey. Maria, Jana, and Amer who scored this item as 5, said they felt a sense belonging of belonging in the physics class. However, while Maria and Jana linked this feeling to previous familiarity with their classmates, Amer linked it to collaborative group work in physics class. On the other hand, Asma who moderately agreed on the relevant survey item (scores as 3), said she had known her classmates since 5th grade and assumed that the physics class should be a space for learning rather than socializing.

On the other hand, the teacher's response to the interview question revealed two themes: *school policies* and *the perceived importance of school subjects*. Similar to the students, the teacher emphasized the students had known each other since 5th grade which fostered their sense of belonging to the group. This was due to a school policy which dictated that students be in the same group from 5th grade until 12th grade. It was also related to another policy which constrained the enrolment of new students. Furthermore, the teacher perceived physics, unlike civics and language classes, as a content-heavy subject that doesn't have room for building social relationships. In accordance with Asma, he believed that the class should be a space for learning, and with the huge curriculum, he had no time to socialize with them. He assumed that socialization could take place in other less demanding classes, such as language classes and civics but not in science and mathematics classes.

There was an alignment between the teacher’s response in the interview and his response to item 14 on the survey. The teacher strongly agreed that students getting to know each other engendered a sense of belonging in the classroom. However, this sense of belonging to the community was not developed from socializing opportunities in the physics classroom. It was rather developed as a result of previously built social relationships.

Open Communication. *Open Communication* was evident in students’ interactions with each other and the teacher. Unlike the other categories of the three presence types, this category was addressed by two interview questions addressing whether students felt comfortable participating in class discussions and disagreeing with their classmates. Thereby, two themes emerged: *feelings toward participation in class discussions* and *feelings toward disagreeing with classmates*. Each theme encompassed various emotions. Asma, Jana, and Amer expressed feeling comfortable and confident when engaged in class discussions. On the other hand, Maria shared that she experiences social anxiety and gets "nervous" when talking to others in a face-to-face setting, which may affect her willingness and comfort level in participating in class discussions. As for sharing different perspectives, Asma and Jana said they felt comfortable disagreeing with their classmates. However, while Asma embraced the variability in answers as a learning opportunity, Jana seeked reassurance from the teacher (e.g., gestural reassurance) before sharing a different perspective. Amer's response included some contradictions; he shared feeling comfortable when disagreeing but he also shared his need for reassurance. His elaboration was more like recommendations for himself to become less hesitant when sharing, " I feel confident. I have to be confident and argue for my point of view. Maybe I was right.. if they didn't like my point of view, I will keep it for myself… I need to make sure of my answer before I say it. I can't say it spontaneously, maybe it is wrong… I ask the teacher about my uncertainty and if he assures my answer, I share it."

Under the first theme, students' responses in the interview and the survey (item 17) demonstrated a significant level of consistency. Asma, Jana, and Amer shared feeling comfortable to participate in class discussions and scored item 17 as 4, 5, and 4, respectively. Additionally, Maria who experienced social anxiety had a neutral stance on item 17.

Similarly, students' responses in the interview and to item 19 of the survey demonstrated a signifant level of alignment under the second theme. Asma and Jana who said were comfortable sharing different perspectives, agreed on item 19 (scored as 4). However, Maria who said she would feel "a little bit weird" and need teacher's reinforcement to sometimes share a different view point, had a neutral stance on item 19. Lastly, Amer who scored item 19 as 2, shared that he couldn't spontaneously share his point of view for "maybe it is wrong" he said, "I ask the teacher about my uncertainty and if he assures my answer, I share it".

As for the teacher, two themes emerged from his responses in the interview: *students' attitudes towards participating in class discussions* and *supporting strategies*. As previously mentioned, the teacher emphasized that the physics class provided limited opportunities for social interactions as physics is demanding subject which students were learning for the first time as 7th graders. He claimed that students get to know each other academically but not socially in his class, “I tell students from the beginning of the year their questions should be restricted to physics, whether it is physics question from our textbook or out of the curriculum. I don’t mind [answering] any physics-related questions. This is more convenient for them and for me as well”. Concerning students’ attitudes, the teacher said that students differed in their attitudes toward participation in class discourse and sharing different perspectives. Some students actively participated and tended to dominate the discussions while other were shy and hesitant. The second theme emerged when the teacher described the strategies, he used to support the latter group of students. The teacher shared that he aimed to “break the ice” in a low stake environment thus making students feel comfortable communicating with him. Additionally, he believed that as students become more familiar with him over time, the fear and shyness barriers to participation and sharing various perspectives would diminish.

Furthermore, in the survey, the teacher agreed on items 17 and 19 (scored as 4) which indicate his positive attitude toward his approach to actively engaging students in class discussions and sharing various perspectives as he mentioned in the interview.

Teaching Presence. The following paragraphs summarize the themes that emerged from the teacher’s and students’ responses to the teaching presence-related interview questions.

Instructional Design. One of the instructional design indicators is to clearly *communicate important lesson goals*, a theme that was identified in students’ responses. All the interviewed students agreed that their teacher shared lesson goals at the beginning of each lesson though Maria commented that the teacher did this inconsistently.

These responses come in alignment with the students' responses to item 2 of the CoI survey. Asma, Jana, and Amer rated this survey item as 4 while Maria rated it as 3; thus, aligning with her response in the interview, "Sometimes he said this is the goals of the lesson and he actually obeys them".

On the other hand, the teacher assumed he clearly communicated lesson goals at the beginning of every lesson, stating that "Each lesson has its own goals written at the very beginning [in the textbook]. I either read them [the goals] for them [the students] or we write them on the board. And if any of the goals was covered before [in prior lesson], I link to it". This response comes in alignment with the teacher's rating for item 2 of the CoI survey which he scored as 5.

Facilitating Discourse. This category of TP entails teacher's attempts to help keep students engaged and participating in productive dialogue. Students had varying responses to the relevant interview question which led to the emergence of three themes: *students' attitudes toward participating in class discussions*, *obstacles to participation in productive dialogue*, and *teacher's efforts to motivate students*. The first two themes theme emerged from Maria's response only, "Sometimes like if I get nervous to say my answer or it's like changed. If I change my answer and I think it's right or no; like I raise my hand to answer but I don't say my answer". Obstacles to participation in productive dialogue, as demonstrated by Maria, were fear of being ridiculed for saying a wrong answer and students' disruptive behavior which resulted in interruption of discussion and inefficient use of time. Despite these obstacles, the four students said the teacher helped to keep them engaged in productive dialogue though Jana assumed this wasn't a consistently performed practice.

The responses of Asma, Maria, and Amer appeared to align with what they shared in the interview. However, Jana had contradictory responses. She scored the relevant survey item 5 (strongly agree), but when asked whether she thought the teacher helped ensure a productive dialogue, she responded, "Not always. It is usual". The fact that Jana didn't elaborate on her answer leaves this ambiguous.

Regarding the teacher's responses only one theme emerged. The teacher claimed that he ensured the participation of every student in almost every session. One of the strategies he used to engage students was attracting students' attention and involving them in the whole class discussion whenever he noticed them gazing off. Accordingly, he rated the relevant CoI survey item 5 (Strongly Agree).

Direct Instruction. One of the indicators of *Direct Instruction* was *confirming understanding through assessment and explanatory feedback*. Analyzing students' responses in the interview uncovered three themes: *whether the teacher provided feedback, teacher's feedback for a wrong answer,* and *teacher's feedback for a correct answer.* The four students agreed that the teacher provided feedback to help them understand their strengths and weaknesses relative to lesson goals and objectives. Only Amer elaborated on his response thus evoking the two other themes. Based on Amer's experience, the teacher created a supportive environment in which students' attempts are valued and encouraged. For example, Amer recalled an instant when he shared a wrong answer and the teacher assured him "it is fine, try again". Additionally, in case of a correct answer, the teacher acknowledged students' contributions and complimented on them. For instance, Amer recalled two instances when the teacher praised him, “Bravo, you are focusing” and “Bravo, you did well”.

Comparing students’ responses from the two data sets, interviews and CoI survey, demonstrate an alignment between the responses. Asma, Jana, and Amer rated the relevant survey item (item 12) as 4 or 5 and they explicitly said the teacher provided them with feedback in the interviews. Maria, on the other hand, had a neutral stance on item 12 which could align with her concise response in the interview, “Yes, sometimes”.

On the other hand, the teacher mainly linked feedback to wrong answers. Consequently, two themes emerged: *students’ common mistakes,* and *purpose for providing feedback.* The common mistakes students made were incorrect pronunciation of a word, synthesizing a wrong conclusion, and obtaining wrong information from research either due to using unreliable resources or misinterpreting information. The purposes of providing feedback as appeared in the teacher’s responses were to correct wrong answers or mistakes and to help students be more “specific” in their responses.

This response came in alignment with the teacher’s score for the relevant survey item. The teacher rated the relevant survey item as 5 and, in the interview, he explicitly said that he provided feedback for students.

In summary, there is notable alignment between the interview responses and the data obtained from the CoI survey. This alignment enhances the reliability and validity of our findings, providing a more comprehensive understanding of the learning environment. However, it is crucial to acknowledge some noteworthy exceptions in the students’ and teacher’s responses. For instance, Jana had contradictory responses relevant to survey item 5 about the teacher’s effort to sustain a productive dialogue. The teacher also had contradictory responses regarding the applicability of the knowledge constructed in the physics classroom. Such contradictions could elicit unclarity of the interview questions and/or survey items. They could also relate to the macro and micro multi-layered complexities embedded in the learning environment per se as well as the Lebanese educational system – i.e., outdated curriculum, assessment driven teaching and learning, lack of resources, teacher burnout, unreliable infrastructure, etc. Providing the participants with space, time, and several prompts to elaborate on their responses in the interviews probably motivated them to reflect more deeply on their learning experiences more openly compared to the survey.

Fourth Research Question: The Teacher's and Students' Attitudes Toward the Approach to Language Use Adopted in the Studied Classroom and Toward the Use of Translanguaging in Instruction

In the interviews, the participants were asked to share their attitudes toward the approach to language use in the classroom and how such an approach influenced their interactions. They were also explicitly asked about their attitudes toward the use of TL in instruction. This section reports the results from thematic analysis of the interviews question responses related to these attitudes toward language use.

Attitudes Toward the Approach to Language Use in the Studied Classroom

The themes identified in the students and teacher's interview regarding their attitudes toward language use in the physics classroom overlapped a lot but weren't identical. Five themes were identified in each of the student and teacher interview, four of which were common: 1) Home language offers pedagogical benefits, 2) Home language is a resource for communication, 3) Hierarchy of languages, 4) Language of the curriculum and instruction. As for the fifth theme, one student highlighted the language of assessment while the teacher emphasized the language of the physics problem genre. Following is a delineation of the themes as they emerged in the teacher and students' interviews.

Teacher's Attitudes. Following are the themes that emerged from the teacher's responses to the questions regarding his attitudes toward the approach to language use adopted in the classroom.

Home Language Offers Pedagogical Benefits. Although the school adopted an English only language policy for the teaching of science and mathematics, the teacher didn't strictly follow the policy as he believed that the use of Arabic along with English was essential for students learning and communication. He believed a major problem students encountered (even in higher grade levels) was misunderstanding the problems in textbooks and assessments because they were in English. Hence, he needed to use Arabic to explain terminology, ensure students' understanding of physics concepts, clarify prompts, and engage students in class discussions.

Home Language is a Resource for Communication. The teacher believed that students could neither communicate with each other nor with him fully in English; they needed to use Arabic for this purpose. They needed "their home language, their major language" to interact with others, as he said.

Hierarchy of Languages. The teacher posited that English is a dominant language. As he phrased it, "English is a universal language. I cannot switch fully to Arabic. If they [students] want to do research, it is easier in English. In Arabic, there are no resources .. or limited resources; we can't say there aren't any".

Language of the Curriculum and Instruction. The teacher believed the curriculum should be in English, but the language of instruction should be the students' home language along with the key terms and symbols used in the curriculum.

Language of the Physics Problem Genre. The teacher underscored the language of the physics problems genre as a substantial challenge for students' understanding of physics problems and their achievement. He said that his students (in both middle and secondary school) weren't proficient in English; thus, they faced difficulty understanding the science genre and scientific register. "This way of posing problems wasn't changed by those who preceded us, would neither be changed by us nor by the next generation of educators," he commented. He also assumed that "those [students] who do not practice solving physics problems will not understand what the question requires them to find [determine, prove, etc.]". One way to support students in understanding the physics problems, he believed, is to explicitly teach the common action verbs posed in physics problems, such as "describe," "explain," "classify," "determine," etc.

Students' Attitudes. The following paragraphs present the themes that emerged from students' responses.

Home Language Offers Pedagogical Benefits. In general, students considered the use of their home language essential for their understanding of physics. Even Asma and Abed who were confident in their proficiency in the English language asserted their need for the use of Arabic for a better understanding of physics, especially when the concepts were abstract or required mathematical knowledge or skills.

Home Language is a Resource for Communication. While Amer and Asma expressed confidence in their proficiency in English and hence were able to communicate with others and with the teacher, Maria and Jana expressed their need for Arabic to communicate with their classmates and the teacher especially when they wanted to ask him about ideas they didn’t quite well understand.

Hierarchy of Languages. Asma, Maria, and Amer believed English is a universal language and the use of English in textbooks is more prestigious than the use of Arabic. Unquestioning the dominance of English language, Asma commented "the textbooks should be in the English language because the textbooks are already in English”.

Language of the Curriculum and Instruction. The four students believed they got used to having the textbook in English but the explanation of the textbook content in Arabic by the teacher was necessary for their understanding. They emphasized the need for the Arabic language especially when learning abstract or challenging topics. For instance, Amer emphasized the need for Arabic when mathematical knowledge and skills are integrated with physics topics and when learning compelling ideas. Notably, Asma shared that her language choice depended on the language used by the teacher. “When he is explaining and I want to participate, I use the same language he is using”, she elaborated.

The Influence of the Language of Assessment. Students weren’t asked about the language used for assessment; this theme emerged only in Asma’s interview. Asma believed the use of English in instruction and synthesis of answers was pivotal for getting high grades in assessments which are typically in English. It is noteworthy to mention that Asma was a diligent student who actively sought to learn the correct answers and placed significant importance on achieving high grades.

Attitudes Toward Translanguaging

Themes emerging from the teacher and students interviews regarding their attitudes toward TL in instruction overlapped a lot but weren't identical. For instance, both the teacher and the students assumed TL to be their preferred pedagogy and considered it as culturally sustaining pedagogy. The teacher also assumed that TL is a just pedagogy and shared his opinion about the tensions between language and content learning. The identified themes are articulated below as they emerged in the teacher and student interview.

Teacher's Attitudes. The following paragraphs present the themes that emerged from teacher's responses to the interview questions.

TL as a Preferred Pedagogy. Although the teacher preferred the textbook be in English, the universal language, he preferred TL be used as a medium for instruction. The teacher had a very positive attitude toward the use of TL. He linked it to deeper understanding, a higher level of participation, and more opportunities for communication.

Translanguaging as a Just Pedagogy. The teacher expressed his discontent with the use of English only at the expense of students' understanding: "It is unfair. We are not being fair with students [when we use English-only] because their English is still poor and it is the first year, they study physics. They haven't been exposed to physics before." Additionally, the teacher referenced a few instances when he asked students to share their answers in English only, "I tried [to have them share answer in English only]. They couldn't say the full answer in English only. It doesn't work. A student can't express the full answer in English only. It doesn't work". In response to this unfairness, the teacher suggested the use of TL as a pedagogy of justice for multilingual learners.

Translanguaging as a Culturally Sustaining Pedagogy. The teacher optimistically assumed that the use of Arabic would never have a negative impact, not even on student's proficiency in English language. He expected the use of Arabic to be very positive at all levels since it is the home language of students and a manifestation of their cultural, national, and regional identities.

Opinion about the Tension Between Language Learning and Content Learning. The teacher valued content learning over language development in his class. For instance, he said, "In my opinion, in the sciences and mathematics, I am not interested in students learning English, ok? I am interested in communicating the idea to them as physics. For the piece of information to reach them, I sometimes need to use another language, Arabic".

Students' Attitudes. The following paragraphs present the themes that emerged from students' responses to the interview questions.

Translanguaging as a Preferred Pedagogy. The four students exhibited their preference for the use of both languages in the teaching and learning of physics and other science subjects particularly when the studied topics are abstract and challenging. However, Maria felt that modern standard Arabic (MSA) was not easy to comprehend. She preferred English over MSA, "like sometimes he [the teacher] says something in Arabic which I don't understand. Since I am not educated in [Modern Standard] Arabic that much, so I prefer in English and sometimes in Arabic [the dialect]." Maria also emphasized the importance of using discipline specific terminology in English while explaining in Arabic, "because in Arabic, it won't be understood. We say rated voltage, in Arabic it is a weird word that I don’t know [how to say it in Arabic]”. Even Amer who liked English more than Arabic and felt that English was his language, declared “I need Arabic, my mother language because I understand it better”. Moreover, the four students expressed the bigger comfort and confidence they felt when they were allowed to translanguage and when the teacher explained terminology using Arabic as well. They felt that TL, particularly the use of their home language, supported their understanding and communication.

Translanguaging as a Culturally Sustaining Pedagogy. This theme emerged from the responses of Amer and Jana. Amer believed his classmates used Arabic spontaneously since they are Arabs and Arabic is their home language. In accordance, Jana commented in English, “Yeah. since we are Arabs, so we really define more Arabic than English. But still, we take English we really need. English at the same time in lessons".

Summary of the Results Chapter

This chapter provided a comprehensive analysis of various data sources used in this study: classroom discourse transcripts, the CoI survey responses, and the interview transcripts.

The analysis of the classroom discourse transcripts from the lens of CoI framework revealed the dominance of TP over SP and CP, where the latter occurred the least. The teacher mainly employed *Direct Instruction*, followed by *Instructional Design* and finally *Facilitating Discourse*. Most of the utterances conveying CP mainly occurred in the first two phases of the critical thinking cycle, *Triggering Event* and *Exploration* followed by *Integration*. Students rarely engaged in the fourth phase, *Resolution*. SP was dominated by *Group Cohesion*, followed by *Open Communication* and *Affective Expression*. These results suggest that the teacher's instructional approach leaned toward a didactic style, with the teacher taking on a central role in delivering information and guiding the learning process.

The analysis of the classroom discourse transcripts from the lens of both CoI framework and language use uncovered interesting insights. English only was predominantly used for CP in all the categories except *Resolution*. The main use of English only particularly for triggering events and creating solutions implies that English as a language was restricted to text, either read from the textbook or written as a solution to the problem. *Resolution* was dominated by Arabic only, eliciting the importance of using home language for conducting cognitively demanding tasks. SP was dominated by Arabic only followed by mixed utterances, and finally English only; thus, revealing the importance of home language for social interactions. TP was dominated by English, followed by mixed utterances and Arabic. Interestingly, none of the TP indicators was dominated by the use of Arabic only. C*onfirming understanding through assessment and feedback*, *specifying the language to be used*, *teacher repeats*, and *creating solutions* were dominated by English only. Meanwhile, *presenting content and questions*, *focusing discussion, summarizing discussion*, *diagnosing misconceptions, injecting knowledge from diverse sources, explaining terminology, scaffolding*, and *clarifying assessment prompts* were dominated by a mix of English and Arabic.

Comparing the language use across the seven sessions revealed the predominance of Arabic only in the session a summative assessment took place. In this particular session, students engaged more actively in all the phases of CP and reflected on their learning the most.

The results of the CoI survey aligned with the classroom observation and interview analyses. For instance, both students and their teacher perceived TP to dominate the learning environment the learning environment followed by SP and CP. In general, students and the teacher's survey responses were also consistent with their responses in the interviews.

Furthermore, the interviews shed light on the participants' attitudes toward the approach to language use adopted in the physics class as well as their attitudes toward the use of TL. The teacher and students advocated for TL to be used in instruction considering it is a supportive, resourceful, just, and culturally sustaining pedagogy.

CHAPTER 5

DISCUSSION

Discussion of Results

Four research questions were addressed in this study. The first research question aimed to examine the quality of the learning environment from the perspective of the CoI framework. The second research question addressed the roles played by TL in enacting the cognitive, social, and teaching presences. The third question explored the teacher's and students' perceptions of the learning environment from the lens of the CoI survey. Finally, the fourth research question aimed to identify the teacher's and students' attitudes regarding the approach to language use adopted in the physics class in addition to their attitudes toward the use of TL in instruction. Following is a discussion of the results addressing each research question in relation to relevant literature.

What is the quality of the learning in a Lebanese classroom as understood from the lens of the Community of Inquiry framework?

The majority of research on CoI framework has been centered around its application in distance learning environments mainly in higher education (Garrison, 2017). A few studies have explored its application in blended learning environments and compared students' learning experiences in the face-to-face part of the course with the computer-mediated (i.e., asynchronous or threaded) part of the course (Meyer, 2003; Vaughan & Garrison, 2006). A scarce number of studies expanded the exploration of CoI framework into K-12 education in blended settings (Villanueva, 2021; Villanueva et al., 2022; Zhang, 2018). However, there probably exists no study that examined the CoI framework in a fully face-to-face learning setting. Hence, what distinguishes this study is that it applied the CoI framework to analyze the teacher and students' interactions in a fully face-to-face multilingual K-12 setting including a high-stakes learning environment in Lebanon. Additionally, while most of the studies on CoI addressed one or two presences (e..g., Villanueva, 2021; Villanueva et al., 2022; Tirado Morueta et al., 2016), this study addressed the three presences altogether.

The analysis of the results of this study indicates that most of the indicators of the three presences were evident in the studied classroom. The CoI framework helped to analyze the discussions in the Lebanese face-to-face physics classroom. Thus, the model not only offers valuable insights for online learning (D. R. Garrison & Arbaugh, 2007) and blended learning (Meyer, 2003; Vaughan & Garrison, 2006), but also for face-to-face learning environments. However, to effectively function in the face-to-face learning environments a few necessary adaptations were made to the CoI framework.

Coding the teacher's and students' linguistic interactions over the seven physics sessions using the adapted framework revealed that the TP was the most prominent presence type (40%) followed by SP (33%) and CP (27%). Following is a discussion of each presence type starting with the ultimate goal of a learning environment- i.e., CP.

Cognitive Presence. The least occurring presence type in this study, i.e., CP, was the most challenging to establish in the face-to-face setting. This comes in alignment with findings in online and blended settings (Garrison, 2017; Meyer, 2003; Vaughan & Garrison, 2006). Reviewing the literature on CoI, Garrison and Arbaugh (2007) reported that students consistently stall at the lower phases of the developmental cycle of practical inquiry (i.e., *Triggering Event* and *Exploration*). The two researchers wondered whether the challenge to move to the *Resolution* phase lies in the "contrived nature of the educational context, the communication medium, or perhaps the nature of teaching presence" (p.162). Yet, they leaned toward the third factor. Garrison and colleagues (Garrison, 2017; Garrison & Arbaugh, 2007; Garrison et al., 2010) speculate that ineffective TP could be responsible for not moving beyond *Exploration*. "[T]eaching presence ", they argue, "in the form of designing learning activities that require solutions and that provide facilitation and direction will ensure students move through the phases of the PI [Practical Inquiry] model in a timely manner" (Garrison et al., 2010, p.7).

Further, Garrison and colleagues (Garrison, 2017; Garrison et al., 2010) assume *Integration* and *Resolution* are more cognitively demanding than the two preceding phases for they require reflective skills and more time. For instance, in the *Integration* phase, learners need time to reflect on their learning and construct meaning from multiple sources. They may also hesitate to offer tentative solutions due to potential rejection. Additionally, in the *Resolution* phase, learners require time for applying, defending, testing, and reflecting on solutions. Nevertheless, the time dedicated to learning activities in classrooms may not be sufficient for learners to employ higher order skills.

In a review on the factors impacting online learning experiences as informed by the community of inquiry framework, Caskurlu et al. (2021) identified time to think and reflect as an important factor that supports the learning process and impacts student satisfaction. For instance, Meyer's (2003) found that graduate students experiencing a blended leadership course felt constrained in face-to-face setting in the sense that they didn't have enough time to reflect on the responses of their colleagues. Consequently, they preferred threaded discussions for this setting provided them with time to reflect on the posts and responses of their colleagues before developing their own responses.

Hence, Meyer (2003) recommended students be given time for activities or topics that require reflection, preferring asynchronous discussions for such activities.

Similar to the findings reported in online (Garrison et al., 2001) and K-12 blended learning settings (Villanueva et al., 2022), students in this study engaged the most in *Exploration* (36.82%) and the least in *Integration* (26.84%) and *Resolution* (5.81%). In the *Integration* phase, stucoi survedents mainly created *solutions for the problems posed in the textbook* guided by the teacher's facilitation. However, as will be discussed later, many times the teacher rushed to *providing solutions* to questions with minimal to no wait time provided for the students to think and reflect. Additionally, students almost only engaged in *Resolution* when they underwent a summative assessment eliciting their capability to engage in higher order thinking in a moment-to-moment interaction when the learning activities were designed for this purpose and the teacher framed his guidance and facilitation toward this goal.

Nevertheless, although these findings corroborate with several studies, they contradict with the findings of Villanueva and colleagues (Villanueva, 2021; Villanueva et al., 2022) who reported that CP was the most prominent among the three presence types in 7th and 10th grade blended class discussions. Those findings could be attributed to course design and the style of teacher facilitation, which in this case, nurtured critical thinking, reflections, and student agency.

Social Presence. The fact that students had known each other, as a community of learners since 5th grade in addition to the commonalities between students' academic and non-academic experiences evoked the development of a shared social identity. For instance, all the participating students were Lebanese multilingual students, speaking the Lebanese dialect as their home language, sharing similar socioeconomic status, and being in a context that emphasizes teacher presence and achievement in high-stakes tests. Such a shared social identity (or identities) might have contributed to the high level of SP, particularly *Group Cohesion* (Rogers & Lea, 2005). However, as underscored by Rogers and Lea (2005) and Garrison (2017), SP in this study wasn't constrained in interpersonal relationships. It extended to nurture the development of CP in the sense that the participants socially interacted requesting permission to share their thoughts, joking about messy drawings of electric circuits that led to amendments in the drawings, providing technical support regarding how to use the interactive board, etc.

Further, findings from this study illuminate differences between online and face-to-face interactions primarily in the *Interactive (Open Communication)* category. In the face-to-face setting, students engaged in classroom management tasks, such as organizing the physical space, asking vocal students to keep it down, etc.). Following classroom norms, students requested permission to participate and to perform non-academic activities as well (e.g., going to the restroom). Additionally, *managing turn taking* was an indicator distinguishing the teacher's and students' interactions in the face-to-face setting (or synchronous) from asynchronous setting. The teacher and the students mainly uttered a "Yes" to manage turn taking. These *Open Communication* indicators, except for classroom management (McDonald & Loch, 2008), haven't been documented in previous studies that explored SP in online and blended settings.

Teaching Presence. The learning environment in the studied physics class was dominated by TP. Unlike some studies (e.g., Anderson et al., 2001), the TP in this study was confined to the teacher's actions; students didn't facilitate a discussion in the physics class. Any teaching-related role they played was mainly constrained to *classroom management* which was coded as SP. This helped to understand the role the teacher in the studied learning environment through TP.

TP was dominated by *Direct Instruction*. The teacher primarily engaged in *confirming understanding* and *creating solutions*. As for *confirming understanding,* the teacher's feedback most of the time wasn't detailed or explanatory. The teacher was observed to assess students' responses as correct or false and promptly provide the correct answer in case a student shared a wrong answer. He was also observed to rush to *creating solutions* for the questions posed by textbook, himself, or the students with no instances of *identifying areas of agreement or disagreement* among students. The brevity of the feedback elicits a more transactional approach to teaching where the goal is to move quickly through the content rather than deeply engage with students' understanding. This teaching strategy is most probably one of the major reasons for students' stalling in the lower phases of practical inquiry.

Mixed findings exist in the literature for TP. On one hand, the dominance of *Direct Instruction* resonates with Anderson et al.'s (2001) methodological study where *Direct Instruction* was also observed to dominate the instructor posts in graduate courses. However, while in Anderson et al.'s study students moderated a significant part of the discussions, enacting TP, no student in this study was given the opportunity to facilitate a discussion. Moreover, while in Anderson et al. *Instructional Design* occurred the least, in this study *Facilitating Discourse* occurred the least with no instances of *identifying areas of agreement or disagreement*. As for *Instructional Design*, the teacher utterances were mainly centered around *designing methods* (e.g., assigning roles) and *establishing etiquette.* These findings could elicit teacher-centeredness and didactic instruction in the studied face-to-face physics class. The physics teacher's instructional style seems to resonates with Amin and Badreddine (2020) description of the instructional style of two grade one science teachers who strictly followed a triadic IRF interaction, Initiation(Teacher)- Response(Student)- Follow up(Teacher), in a Lebanese private school. The "teachers tightly controlled the topic under consideration, who could participate when, and they managed student contributions to ensure/establish their relevance to the topic at hand" (Amin & Badreddine, 2020, p. 2324).

On the other hand, as aforementioned, comparing the findings from this study to the findings in a K-12 context in Philippines reveals some contradictions. While TP dominated the learning environment in this study, it didn't dominate the learning environment in Villanueva et al.'s study (2022). Also, while most of the teacher's actions in this study were menifestations of *Direct instruction*, the majority of the teacher's' actions in Villanueva's (2021) study were menifestations of *Facilitating Discourse*. The predominance of *Facilitating Discourse* actions in K-12, "means that teachers explicitly communicate ways to make students comfortable with self-expression. These, in turn, foster interaction which demonstrates that their ideas and responses are welcomed by both peers and teachers" (p. 38).

In conclusion, the percentage of occurrence of the presences can most likely be attributed to the design of the learning activities and teachers' approach to teaching/facilitation. When the key elements to the design of the learning environment are critical thinking, reflection, and student facilitation of discussion, CP tends to accentuate. Meanwhile, when the emphasis is on curriculum coverage and high-stakes testing, TP dominates the learning environment. These findings underscore the significance of curriculum design and teacher practices, highlighting the necessity for curriculum developers and teachers to remain cognizant of these influential factors.

What roles does translanguaging play in enacting the cognitive, social, and teaching presences in a multilingual physics classroom?

Despite the restrictive language policy and the teacher's attempts to model and push students to use English only, both the teacher and the students used their different linguistic resources for various purposes. Analysis of the classroom discourse transcripts revealed that both the teacher and students translanguaged spontaneously. Students mainly used Arabic only followed by English only and mixed utterances. Meanwhile, the teacher used English only, Arabic only, and mixed utterances fairly evenly. The teacher and the students used English only almost equally, but the teacher used less Arabic and more mixed utterances. Nevertheless, the teacher didn't strategically plan the use of a particular language for a specific action or task. Examining the language of the utterances in relation to CoI indicators unveils the functions played by TL in enacting each of the cognitive, social, and teaching presences. The results are discussed at the level of each presence type in concert with relevant research, primarily studies conducted in the Lebanese context to demonstrate the functions of the languages used by teacher and students.

Cognitive Presence. This type of presence was dominated by English only followed by mixed and Arabic only utterances. English only was mainly constrained to text and short utterances. Students predominantly used English only to convey conceptual understanding primarily in written text. Most of their English utterances corresponded to instances where they were reading a text from the textbook (a problem or a new topic) or writing a text (e.g., a solution to a problem while reading aloud) on the board and the copybook. Additionally, similar to previous findings in K-12 science classrooms in Lebanon, students used English only to share short factual utterances when exchanging information (Salloum & BouJaoude, 2019) and to confirm their understanding using short utterances, such as "yes!".

Further, in resonance with the findings of Salloum and BouJaoude (2019), when students used mixed utterances, they mostly spoke in Arabic but used discipline-specific terminology in English. For instance, students in this study felt the need to use mixed utterances when *expressing a sense of puzzlement*, *exchanging information*, and *creating solutions.* However, in some of the *exchanging information* and *creating solutions* utterances, some students started their mixed utterances with the identification article 'the: ال' or 'this:هيدي\هيدا' in the Lebanese dialect to denote technical terms or objects under study and continued their phrases in English. For example, one student said, "The [lamp] B [is] open: B open ال" when asked to determine whether the lamp in circuit B glows. Another student curiously asked the teacher, "The magnet (is a) conductor?: magnet conductor ال?" after his colleague classified iron as a conductor responding to a question posed in the textbook. This interplay between home language and language of instruction could demonstrate how everyday discourse could be bridged with scientific discourse.

As for Arabic only, students mainly used their home language to *express a sense of puzzlement*, *confirm no understanding*, *defend their solutions*, and *reflect on their learning*. Home language appeared to facilitate instances of puzzlement intertwined with epistemic affect; however, those moments weren't opened up by the teacher. For instance, in the first attended session, when a student clearly exhibiting low engagement in the class discussion, heard the response of her colleague, "True (the human body is a good conductor of electricity)”, her framing of the discussion suddenly shifted. That piece of information appeared to trigger her ‘epistemic affect’ (Jaber & Hammer, 2016). “So, we, our body conducts [electricity]?! Does this mean that I [my body] can light up a lamp?!”, she expressed awe in her home language wondering with a tone of excitement. Everyday sense making, including such moments of puzzlement, can be leveraged as an intellectual resource for linguistically and culturally diverse students (Warren et al., 2001). If unfolded, such opportunities could have created a space where TL along with epistemic affect could facilitate the bridging between outside-school and inside-school discursive practices and ways of knowing.

Notably, students mostly used Arabic only when positioned in a high stakes learning environment. Students almost only engaged in *reflection* and *defending solutions* when they underwent a summative assessment and corrected the assessment in a whole group discussion. During this engagement, students mainly uttered Arabic only utterances and mixed utterances. Further, in this context and unlike all the other sessions, *Triggering Event* utterances were dominated by the use of Arabic only; thus, shedding light on the students’ need for their home language to understand the requirements of the task (Creese & Blackledge, 2010; García & Wei, 2014). If students do not understand, how can they learn or provide a solution to the posed problem (UNESCO, 2016)? This finding resonates with the speculation that using a foreign language in instruction and assessment could result in students’ underachievement in international comparative assessments, such as TIMSS (BouJaoude & El-Hage, 2016; Reddy et al., 2016; Thomas & Collier, 1997).

Social Presence. The global pattern of language use in SP was Arabic only used with greatest frequency, followed by mixed utterances, and English only as the least used language. The three categories of SP followed the same pattern of language use. Even the indicators added to the original coding scheme (*managing turn-taking*, *requesting permission to participate*, and *requesting permission for non-academic activities*) were dominated by the use of Arabic only.

Similar to findings in other studies conducted in online contexts, the teacher and the students translanguaged primarily using their home language to enact various social functions such as affective expression and interpersonal relationships (Cahyani et al., 2016), community building, and group cohesion (Hafner et al., 2015).

Teaching Presence. The teacher used Arabic only, English only, and mixed utterances fairly evenly. He mainly used Arabic only for *Instructional Design and Organization* and *Facilitating Discourse* utterances. Meanwhile, he primarily used either English only or mixed utterances for *Direct Instruction*. Particularly, he used Arabic freely to support students' conceptual understanding but shifted to English only when synthesizing end products and modeling responses for high stakes tests. Accordingly, in Salloum and BouJaoude's (2019) study, 9th-grade private school science teachers mainly used Arabic to maintain classroom management and to direct students during activity transition. Nevertheless, the language use of the physics teacher in concert with *Direct Instruction* resonates with the approach to language used by Lebanese public school science teachers who commonly used Arabic for explaining and elaborating on science concepts rather than the private school teachers who "minimally used [Arabic] for explaining or elaborating on science concepts (Salloum & BouJaoude, 2019, p.19). The teacher's approach to using Arabic only or Arabic along with English for various purposes in his utterances elicit his agentive and resistive response to the prevailing English only school policy (Cahyani et al., 2016).

Interestingly, though the teacher used students' home language in *Direct Instruction*, none of the indicators of this category was dominated by the use of Arabic only. This finding could elicit the teacher's inclination to use the language of instruction and assessment more often and adhere to the language-in-education education policy.

Concerning the use of English only, four indicators of *Direct Instruction* were dominated by the use of English only. These indicators were c*onfirming understanding through assessment and feedback*, *specifying the language to be used*, *teacher repeats*, and *creating solutions.* On the one hand, for *confirming understanding* and *specifying the language to be used*, the teacher mostly used brief English utterances (e.g., "Correct", "Ok?", "In English please"). This pattern aligns with the students' inclination to use English in short utterances (Salloum & BouJaoude, 2019). However, the use of English for *specifying the language to be used* (i.e., English only), demonstrates the teacher modeling the use of English only as he invited students to use English. This resonates with Asma's awareness of her use of the same language the teacher is using, "When he is explaining and I want to participate, I use the same language he is using".

On the other hand, *creating solutions* and *teacher repeats (created solutions)* were longer English utterances. The use of English only when *creating solutions* reflects the standardization of English for academic subjects and teacher's preparation of students for assessments (Salloum & BouJaoude, 2017). Additionally, the teacher's explicitness regarding the need to use English only when synthesizing a final product (i.e., a solution to a problem) by asking students to respond in English and modeling the use of English in synthesizing final products as they need to be written in an assessment could indicate the teacher's pursuit to teach less advantaged students the language of power (Delpit, 1995). This speculations is not uncommon in the Lebanese context

(Salloum & BouJaoude, 2017) in the sense that teachers tend to be explicit about teaching less advantaged students the "authoritarian discourse of high-stakes tests" (p. 854).

The other *Direct Instruction* actions were performed by the teacher using mixed utterances. In alignment with other research findings in Lebanon (Salloum & BouJaoude, 2019), the teacher used a combination of English and Arabic to explain and elaborated on topics and when connecting school science to students everyday life. He also used mixed utterances for *focusing discussion, summarizing discussion, diagnosing misconceptions, explaining terminology, scaffolding,* and *clarifying assessment prompts*. In resonance with the trend identified in the students' utterances in this study and in Salloum and BouJaoude's study (2019), when the teacher used mixed utterances, he mainly spoke discipline-specific terminology in English and elaborated on them using students' home language.

In brief, the enactment of TL in the studied physics classroom appears to be an agentive and resistive response to the prevailing English only school policy. Both the teacher and the students translanguaged naturally and spontaneously to perform various cognitive and social actions. The teacher's TL practices extended to perform various organizational tasks, facilitating discussion, and delivering instruction. Similar to Licona and Kelly's findings (2020) in two grade 7 science classes, TL appeared to serve the four major purposes of TL pedagogy suggested by García, Ibarra Johnson, and Seltzer (2017): to 1) bolster student engagement and sensemaking of complex discipline- specific texts, topics and triggering events; 2) create opportunities for students to engage in translingual practices including the use of English only for academic purposes (i.e., synthesizing end products); 3) create a space for less advantaged students multilingualism and ways of knowing; and 4) support the expression and development of students' multilingual identities. Thus, TL contributed to creating a dynamic and inclusive learning environment that catered to the linguistic needs of students.

What are the teacher's and learners' perceptions of the three types of presence from the lens of the CoI Survey?

The CoI survey has been used for various purposes since its inception. It has been used "to explore a single learning environment, to examine differences using the CoI survey, to observe relationships among the different elements of CoI and their relationships with other data, and to address the reliability and/or validity of data using the CoI survey" (Stenbom, 2017; p. 25). In this study, the adapted and translated CoI survey was used to examine the teacher's and students' perceptions of the three presences according to their experiences in the face-to-face physics classroom.

Unlike most of the existing studies deploying the CoI survey, both the teacher and the students responded to the CoI survey, and their results were contrasted. The findings revealed that the teacher and the students perceived that TP occurred the most in the physics class. However, the teacher had higher perceptions of the three presences. These results come in alignment with the analysis of the classroom discourse transcripts and the participants' responses in the interviews. Nevertheless, these findings contradict with the students' ratings in Villanueva et al.'s (2022) study in the sense that students had the highest perception for CP. Again, this is most probably due to the nature of the designed learning activities which promoted critical thinking, reflection, and student agency.

Concerning CP, interestingly in this study, items 25 and 33 corresponding to the 3rd and 4th phases of practical inquiry cycle respectively, were given the lowest scores by both the teacher and the students. The teacher and students had a neutral (or close to neutral) stance regarding the affordance of the learning environment to use a variety of information sources to explore the posed problems and knowledge application in non-class related activities. In the interviews, students critiqued the shallowness of the Lebanese physics curriculum assuming it limited their critical thinking. Notwithstanding the fact that critical thinking is emphasized as one of the learning outcomes of the Lebanese curriculum (Ministry of Education and Higher Education, 1997), the content itself doesn't promote critical thinking and the conducted assessments do not assess critical thinking as well (Hilal, 2018). Consequently, assuming assessment is the driving force for instruction, the absence of critical thinking assessment in the Lebanese curriculum limits learners' engagement in critical thinking in classroom discourse.

As for SP, in general the teacher and the students shared similar views. Yet, a few disparities existed. For example, the teacher strongly agreed that classroom discussion helped students develop a sense of collaboration while, students, rated this statement 3.7 out of 5 eliciting the focus on individual work or student-teacher interaction rather than student-student interaction or group work in the physics classroom. In a recent thematic synthesis identifying the factors that impact students' online learning, Caskurlu et al. (2021), highlighted "collaboration and working in small groups" (p.5) as one factor under course design that motivates students to be more engaged and productive (Bokhari, 2016). This finding resonates with Amer's response in the interview, “I prefer to have group work every 2-3 sessions since collaborative work is more productive.”

Finally, TP was scored the highest by both the teacher and the students aligning with the teacher’s and students’ responses in the interviews. Though this finding contradicts with students’ responses in Villanueva's (2021) K-12 blended learning study, it accords with the findings of Nagel and Kotzé, (2010). In their study, Nagel and Kotzé examined graduate students’ responses to the CoI survey after half a year of course at the department of Economics and Management Sciences. They found that TP was the strongest presence in the learning environment. Under this presence type, students had the most positive perceptions for *Design and Organization* eliciting good course design that valued peer review, knowledge application, and student sense of belonging. This, in turn, evoked positive perception of CP, particularly the phases of *Integration* and *Resolution*. However, the high perception of TP in the current study concurred with low perceptions of CP, particularly in *Integration* and *Resolution*. This finding elicits surface level learning of facts evoked by a focus on examination and academic achievement.

In conclusion, the CoI survey results in this study revealed the perception of a traditional didactic teaching style. The participating teacher emphasized academic achievement and curriculum coverage, specifically the breadth over depth of content. The taught curriculum appears to be disconnected from real life; students assume it offers them limited opportunities to apply their knowledge. The design of learning activities does not seem to promote critical thinking, reflection, peer review, and student agency.

What are the teacher's and students' attitudes toward the approach to language use in the classroom and toward the use of translanguaging in instruction?

Both the teacher and the students shared overlapping yet nonidentical attitudes toward the approach to language use in the physics classroom and the deployment of TL in the physics classroom.

Attitudes Toward the Approach to Language Use in the Physics Classroom.

Both the teacher and student posited that Arabic and English were dynamically used for various purposes regardless of the English only school policy. They assumed home language offered pedagogical benefits and supported their communication. However, they considered English language more prestigious than Arabic. Unquestioning the dominance of English language, both the students and the teacher asserted the cruciality of learning in this universal language.

Along these lines, a diligent student, Asma, and the teacher highlighted the issue of language in concert with assessment and the physics problem genre, respectively. Asma believed the use of English in instruction, especially when synthesizing end products, was pivotal for achieving high grades in assessments regardless of the challenges herself and her colleagues faced when communicating in English. Notwithstanding, the teacher underscored that the language of the physics problems genre as a substantial challenge for students' understanding of physics problems as well as their academic achievement. This suggests, from a Bakhtinian (1981) perspective (Barwell, 2016), that MLLs encounter 'doubled otherness'; the otherness of the target language (i.e., standard English) and the otherness of the scientific thinking and scientific register (Lin, 2018). The teacher's awareness of this conundrum might justify his focus on teaching students the language of power (Delipt, 1995) reflected in his explicitness of using English when modeling writing end products and inviting students to synthesize end products themselves.

In response to this challenge, several researchers have suggested the explicit teaching of science genres for students, particularly multilingual students. For instance, Halliday and Martin (1993) suggested the explicit teaching of the function, rhetorical structure, and lexicogrammar of each genre. Rothery (1996) proposed the curriculum genre wheel, known as the 'Teaching/Learning Cycle' to facilitate the teaching and learning of science genres. The cycle comprises three iterative phases: 1) the teacher guides the students to deconstruct model texts of a specific genre and discuss the texts' purpose, structure, language features, and content; 2) the teacher and the students co-construct texts of the same genre that was modeled in the deconstruction phase; and 3) students work independently or in groups to construct their own texts. Inspired by the curriculum genre cycle, Lin (2010, 2015a) developed the Multimodalities-Entextualisation Cycle (MEC) as a practical tool for educators in CLIL/CBE (Content based Education) settings guiding them to plan or adapt their instruction to their own contexts. The MEC comprises three iterative stages: 1) the teacher creates a rich multimodal experiential context where both the language of instruction and students' home language(s) are used; 2) students read texts, interact with other multimodalities, and take notes using their home language and the language of instruction; and 3) given scaffolds, students synthesize a text in the target language. in these phases, particularly in the first two phases, Wu and Lin (2019) underscore TL and trans-semiotizing as pivotal semiotic processes that bolster multilingual students' meaning-making of scientific concepts. However, while the teacher, and students to less extent, were observed to use gestures and full-body movements to facilitate meaning making; this study only looked at the verbal contributions of the participants.

Attitudes Toward Translanguaging. Both the teacher and students had very positive attitudes toward the use of TL in the physics classroom. They viewed TL as their preferred approach to teaching and learning and recognized its value as a culturally sustaining pedagogy (Creese & Blackledge, 2010; Woodley & Brown, 2016). In accordance with existing research, they associated TL with higher levels of meaning making, deeper conceptual understanding (Charamba, 2020; Infante & Licona, 2021; Salloum & BouJaoude, 2019), higher levels of participation (Ebe & Chapman-Santiago, 2016; Woodley & Brown, 2016), and expression of cultural and multilingual identities (Charamba, 2020).

Additionally, the teacher considered TL an equitable approach to teaching less advantaged multilingual students who are less proficient in English compared to their affluent counterparts. He also recognized TL as an essential pedagogy in science and mathematics education in the sense that he prioritized conceptual understanding over language acquisition; assuming that language acquisition is eventual as students interact with physics content and discipline-specific terminology. This attitude opposes the attitudes of teachers in Lebanese low SES private and public schools (Salloum & BouJaoude, 2019) shedding light on the teacher's agentive and resistive response to the prevailing monolingual norms in the Lebanese education system.

Finally, a critical issue underscored by the teacher pertains to the Lebanese curriculum in the sense that students are exposed to science as separate subjects (biology, chemistry, and physics) for the first time in grade 7. The challenge is exacerbated for them as they struggle to understand content, scientific register, and language. Thus, the use of home language along with the language of instruction, the teacher suggests, plays a crucial role in supporting 7th-graders’ sensemaking of science concepts.

Limitations

Several findings from this study resonated with existing literature in the Lebanese context and beyond providing valuable insights on the functions of TL in operationalizing the cognitive, social, and teaching presences. Yet, it is important to acknowledge several limitations that influence the interpretation and generalizability of the findings.

First, a critical limitation relates to the conceptualization of TL itself. TL is viewed as the dynamic and fluid use of one’s linguistic repertoire that goes beyond named languages (Vogel & García, 2017). However, for the purpose of this study, the languages used by the participants were named. Naming the languages helped identify the functions deployed by home language; thus, illuminating some recommendations for instructional design to nurture MLLs’ conceptual development and engagement in class community discussions.

The second limitation pertains to the nature of the analyzed interactions. This study focused on linguistic interactions overlooking other semiotic resources such as gestures, visual aids, and other non-verbal cues. Hence, while the study contributes to the understanding of the functions of TL (i.e., the functions of home language in the science classroom), it does not entail the broader spectrum of multimodal communication that might contribute to TL practices and students' meaning making.

Third, the CoI framework was initially developed to analyze and design online learning environments, particularly in higher education. The framework has been deemed appropriate in K-12 blended educational settings in a very limited number of studies (e.g., Villanueva et al., 2022). Nevertheless, it hasn't been studied in a fully face-to-face setting. Hence, for the purpose of this study, the framework was adapted to face-to-face setting. A few indicators were added (e.g., *requesting permission to participate, sharing culture, language, and religion, etc.*) considering the interactions in the specific context under study. While those indicators were evident in the studied classroom and are expected to be evident in many other classrooms in Lebanon, this may not be the case in other contexts. Consequently, further research is needed to test and refine the adapted CoI framework within diverse K-12 face-to-face educational contexts.

Fourth, segmenting the conversational turns into individual utterances for analysis was cumbersome (Garrison et al., 2001; Rourke et al., 2000). Though coding at the message level could have evoked slightly different results, bearing the utterance as the unit of analysis led to precise findings in terms of identifying the roles of students' home language and the language of instruction in enacting the cognitive, social, and teaching presences at the indicator level.

Fifth, the TP in this study was limited to the teacher's actions. Though students were observed to enact some *Instructional Design and Organization* actions (e.g., *classroom management*), they didn't perform *Direct Instruction* actions. The teaching actions performed by students were coded as *classroom management* under SP. This may conflict with Garrison's (2017) assumption that TP is not restricted to the teacher. Students could perform some teaching actions, such as facilitating a lesson or a part of a lesson. Notwithstanding, "[t]his important aspect of TP is, however, currently left out of the survey instrument since all items [in the CoI survey] refer to only what the instructor does" (Stenbom, 2018, p. 27). Thereby, limiting TP to teacher's actions in this study served a reliable comparison between the results of classroom conversation transcript coding and the ratings of TP in the survey.

Sixth, the small sample size might limit the applicability of the findings in other contexts. Only one physics class in a low SES private school participated in this study. The specific group dynamics, demographic composition, and classroom culture of this context might not be fully representative of other classrooms in Lebanon and the region. Additionally, around half of the participants only responded to the CoI survey providing their perceptions of the cognitive, social, and teaching presences constituting the learning environment. Hence, the collected data might not accurately represent the diverse perceptions of the learning environment within the classroom itself.

Fifth, the data was collected during a single unit of study focused on electricity. While several students expressed genuine interest in the topic, it is important to acknowledge that not all students were equally engaged in this topic or even physics as a subject matter. For instance, Amer demonstrated dissatisfaction with physics as a school subject. Another student expressed dissatisfaction with electricity as a topic, assuming that it is a boys' topic. Students' preferences for topics and subject matter might have impacted their levels of participation and the nature of their interactions.

Finally, though the studied classroom was a part of a private school, the findings on TL resonated with public rather than private school science classes analyzed by Salloum and BouJaoude (2019) in Lebanon. This finding limits the generalization across private schools eliciting that the identified TL trends are associated more with the SES of students and their language proficiency than with the type of school (private or public) within the Lebanese context. It could also be associated with the teacher's personal beliefs and attitudes toward TL illuminating his agentive resistive behavior to the prevailing monolingual norms.

In summary, this study contributes to understanding the teacher's and students' interactions in a naturalistic setting including the roles played by TL in enacting the social, cognitive, and teaching presences. Nevertheless, the limitations highlight the need for future research to encompass a wider range of semiotic resources, involve bigger and more diverse samples, and consider various educational contexts including different subject matters and different topics within the same subject.

Recommendations for Future Research

Though the CoI framework was initially developed to analyze online higher education, it appears to be applicable in face-to-face K-12 educational contexts with some adaptations. Yet further research is needed to understand how the framework works in diverse educational contexts, including public schools and private schools. Additionally, further investigation is needed to understand how to shift from studying the existing learning environments using the CoI framework to designing effective learning environments where the three presences are operationalized to create the best learning experiences for students in K-12 educational settings.

The framework also offers valuable insights into the role of TL, particularly the utilization of students' home language for supporting students' cognitive and social engagement through TP. It allows the identification of the functions of home language and the language of instruction for enacting CP, SP, and TP. An interesting finding was the increased use of home language during high-stakes testing eliciting the significance of home language in addressing academic-related psychological factors. Students needed to use their home language to understand the requirements of the tasks and reflect on their learning. Not understanding the requirements of the tasks is a serious issue that can't be ignored. Further research is needed to understand how disadvantaged multilingual learners could be psychologically supported and fairly assessed compared to their counter peers.

As aforementioned, this study focused on TL in the form of linguistic interactions to explore the functions of home language and the language in instruction. Other forms of interaction (e.g., gestures, body movements, material use) were observed to nurture students' meaning making. It is pivotal to explore how the utilization of diverse semiotic resources (i.e., translaguaging/trans-semiotizing) could support multilingual students' conceptual development in diverse K-12 educational settings, including bridging the everyday discursive practices and ways of knowing of linguistically disadvantaged students with the scientific register and scientific thinking (Wu & Lin, 2019).

Finally, though the current study didn't explore epistemic affect, the findings indicate instances where students predominantly used their home language to express puzzlement and uncertainty. These instances intertwine with epistemic affect highlighting two conundrums for future research: 1) How can TL and trans-semiotizing support students when grappling with uncertainty? and 2) How can teachers cultivate epistemic affect to nurture MLLs' cognitive, social, and teaching presences in parallel to their own presence as multilingual teachers?

Recommendations for Practice

The CoI framework provides guidance for analyzing and designing effective learning environments cultivating collaboration, belonging, and higher order thinking skills (Garrison, 2017). This study provides some evidence that the CoI framework is applicable to K-12 educational settings. However, it confirms the flaws of the Lebanese curriculum which hasn't been revised since 1997. Focusing on content acquisition rather than ways of knowing (BouJaoude, 2002), direct problem solving rather than critical thinking, and positing traditional high-stakes testing as the sole determiner of one's success are three main flaws of the outdated curriculum. As such, it provides authority to the textbook and the teacher (Aljaafil & Behyan, 2021) which justifies the dominance of the TP of the teacher in the studied physics classroom. Students in this study and stakeholders in other studies (Aljaafil & Behyan, 2021) view the Lebanese curriculum as outdated and disconnected from their everyday lives. Consequently, curricular reform addressing those flaws is urgently needed to update the two decades and a half-year-old curriculum.

Another significant issue pertains to the language of the curriculum and instruction. A content-heavy curriculum requires high proficiency in the language of the curriculum and instruction posing more challenges for linguistically disadvantaged multilingual students. The findings from this study show that students needed to use their home language for various purposes, ranging from understanding what is required in a task to reflecting on their learning. These findings raise questions about the equitability and inclusivity of the Lebanese curriculum, language-in-education policies, and teaching practices. They also shed light on some translingual practices that could nurture students' cognitive and social presences.

While it is hard for curricular reform to see the light amidst the nations' challenging political and economic situations, a big responsibility falls on the shoulders of policymakers and educators. Policymakers are urged to cater the language-in-education policies to the psychological and academic needs of multilingual learners.

Additionally, educators are encouraged to translanguage utilizing students' home language in instruction to nurture students' cognitive and SP. While findings may differ from one context to another, the findings from this study suggest that the teacher's and learners' use of home language supported their understanding of the posed problems, development of conceptual understanding, and reflection on learning. Hence, it is pivotal when designing instruction that teachers create a space for learners where they feel safe and invited to use their home language for meaning making purposes. The findings also suggest that teachers use the language of instruction when summarizing discussions and synthesizing end products.

Further, "researchers and teachers alike [are encouraged to attend] to [and cultivate] the potentially profound continuities between every day and scientific ways of knowing and talking, and thus to the pedagogical possibilities that may be derived from such an analysis, especially for typically marginalized children" (Warren et al., 2001, p.546). Deploying TL (and trans-semiotizing) could help bridge not only the reflective private world and the shared public world but also the outside-school and inside-school discursive practices and ways of knowing. Consequently, teachers are encouraged to value and build on students' wonderings and ways of thinking to create continuities between every day and school discursive practices and ways of knowing. They are recommended to harness the epistemic affect intertwined with students' wonderings arising from what might be assumed a tangential connection between their everyday and school ways of knowing to genuinely engage them in higher phases of practical inquiry.

In conclusion, the nexus between TL and the Community of Inquiry framework unravels a dual role for multilingual teachers – a mirror and a compass. As a mirror, the Community of Inquiry framework and survey serve as tools for educators to self-assess and reflect on their instructional design and teaching practices. Though cumbersome, identifying translingual practices in relation to community interactions illuminates the functions of TL for enacting cognitive, social, and teaching presences. These tools could help educators gain an understanding of the flow of interactions within the community. As a compass, the CoI framework and the identified translingual practices nurturing cognitive, social, and teaching presences could guide educators to design equitable multilingual inquiry-based learning environments.

Conclusion

This study examined the quality of the learning environment in a typical Lebanese multilingual physics classroom at a school serving students with low socio-economic background from the lens of the Community of Inquiry framework as well as the Community of Inquiry survey. The study also explored roles played by translanguaging in enacting the cognitive, social, and teaching presences in the studies middle school physics classroom. Further, the study examined the attitudes of both the teacher and the students toward the approach to language use adopted in the studied classroom and toward the deployment of TL in the physics classroom. Results showed that analysis of classroom interactions using the adapted CoI coding scheme were in general alignment with responses to the CoI survey and interview questions; thus, suggesting the validity of adopting the CoI framework for analyzing K-12 educational settings. TL was found to serve various cognitive, social, and teaching functions. However, further research is needed to examine the use of CoI framework in diverse face-to-face, online, and blended K-12 educational contexts for both, the analysis and design of effective inquiry-based multilingual learning environments.

APPENDIX A

THE COMMUNITY OF INQUIRY SURVEY[6]

Teaching Presence

Design and Organization

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.

Facilitation

5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.
10. Instructor actions reinforced the development of a sense of community among course participants.

Direct Instruction

11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.
13. The instructor provided feedback in a timely fashion.

Social Presence

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[6] This is the initial CoI survey developed by Arbaugh et al.(2008) adopted from Garrison, D. Randy. *E-Learning in the 21st Century: A Community of Inquiry Framework for Research and Practice*, (p.175). Taylor & Francis Group, 2016.

Affective Expressions

14. Getting to know other course participants gave me a sense of belonging in the class.
15. I was able to form distinct impressions of some course participants.
16. Online or web-based communication is an excellent medium for social interaction.

Open Communication

17. I felt comfortable conversing through the online medium.
18. I felt comfortable participating in the course discussions.
19. I felt comfortable interacting with other course participants.

Group Cohesion

20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
21. I felt that my point of view was acknowledged by other course participants.
22. Online discussions help me to develop a sense of collaboration.

Cognitive Presence

Triggering Event

23. Problems posed increased my interest in course issues.
24. Course activities piqued my curiosity.
25. I felt motivated to explore content related questions.

Exploration

26. I utilized a variety of information sources to explore problems posed in this course.
27. Brainstorming and finding relevant information helped me resolve content related questions.
28. Online discussions were valuable in helping me appreciate different perspectives.

Integration

29. Combining new information helped me answer questions raised in course activities.
30. Learning activities helped me construct explanations/solutions.
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.

Resolution

32. I can describe ways to test and apply the knowledge created in this course.
33. I have developed solutions to course problems that can be applied in practice.

34. I can apply the knowledge created in this course to my work or other non-class related activities.

    5-point Likert-type scale 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

APPENDIX B

STUDENTS' ADAPTED VERSION OF THE COMMUNITY OF INQUIRY SURVEY[7]

Think about your physics teacher and your learning experience in the physics class to indicate your level of agreement with the following statements.

1. The teacher clearly communicated important lesson topics.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. The teacher clearly communicated important lesson goals.
3. The provided clear instructions on how I can participate in lesson learning activities.
4. The teacher clearly communicated important due dates/time frames for learning activities with the students.
5. The teacher was helpful in identifying areas of agreement and disagreement on lesson topics that helped me to learn.
6. The teacher was helpful in guiding the students towards understanding lesson topics in a way that helped them clarify their thinking.
7. The teacher helped to keep students engaged and participating in productive dialogue.
8. The teacher helped keep the students on task in a way that helped me to learn.
9. The teacher encouraged students to explore new concepts in the physics lessons.
10. The teacher's actions reinforced the development of a sense of community among students.
11. The teacher helped to focus class discussions on lesson-relevant issues in a way that helped the students to learn.
12. The teacher provided feedback that helped me understand my strengths and weaknesses relative to the lesson's goals and objectives.
13. The teacher provided feedback to me in a timely fashion.
14. Getting to know my classmates gave me a sense of belonging in the class.
15. I was able to form distinct impressions of some of my classmates.
16. Classroom communication is an excellent medium for social interaction.
17. I felt comfortable participating in the lesson discussions.
18. I felt comfortable interacting with other students.
19. I felt comfortable disagreeing with my classmates about physics-related

[7] This is the adapted teacher's version of the community of inquiry survey.

topics/questions/answers while still maintaining a sense of trust with my classmates.

20. I felt that my point of view was acknowledged by my classmates in the physics class.
21. Classroom discussions help me to develop a sense of collaboration.
22. Problems posed in the physics classroom increased my interest in lesson issues.
23. Physics lesson activities piqued (triggered) my curiosity to learn more.
24. I felt motivated to explore lesson content-related questions in the physics class.
25. I utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons.
26. Brainstorming and finding relevant information helped me and my classmates resolve content-related questions.
27. Classroom discussions were valuable in helping me appreciate different perspectives.
28. Combining new information helped me answer questions raised in lessons activities.
29. Physics learning activities helped me construct explanations/solutions.
30. Reflection on lesson content and discussions helped me understand fundamental concepts in this class.
31. I can describe ways to test and apply the knowledge created in the physics lessons.
32. I have developed solutions to physics problems that can be applied in practice.
33. I can apply the knowledge created in this lesson to non-class related activities (e.g., real-life activities outside school).

APPENDIX C

STUDENTS' COI SURVEY[8]

استبيان المجتمع الاستنبائي الخاص بالتلاميذ

فكّر بالمعلم الذي يعلمك مادة الفيزياء و تجربة التعلم الخاصة بك في صف الفيزياء، و أجب عن الأسئلة التالية.

1. وضّح المعلّم موضوعات مهمة في دروس الفيزياء.

١	٢	٣	٤	٥
لا أوافق بشدة	لا أوافق	إجابة محايدة	أوافق	أوافق بشدة

2. وضّح المعلمُ أهدافًا (objectives)مهمّةً في دروس الفيزياء.
3. قدّم المعلّم تعليمات / إرشاداتٍ واضحة حول كيفية المشاركة في الأنشطة التعلّمية لمادة الفيزياء.
4. أبلغنا المعلم بوضوح أوقات بداية وانتهاء الأنشطة التعلمية.
5. ساعد المعلم التلاميذ على تحديد نقاط الاتفاق والاختلاف في الرأي حول مواضيع الدروس ممّا ساعدني على التعلم.
6. وجّه المعلم الصف نحو فهم مواضيع الدروس بطريقة ساعدتني على التفكير بوضوح.
7. ساهم المعلّم في إشراك التلاميذ في حوارٍ بنّاء/ مُثمر.
8. ساعدَ المعلم في إبقاء التلاميذ مركّزين في الدرس بطريقة ساعدتني على التعلم.
9. شجّع المعلم التلاميذ على التعمّق في فهم أفكار جديدة في دروس مادة الفيزياء.
10. تصرُّفات المعلّم في الصف عزّزت (زادت) تنمية شعوري بالانتماء إلى مجموعة التلاميذ الزملاء في الصف.
11. ركّز المعلم النقاشات الصفية على قضايا عامة ذات صلة بمواضيع الدرس بطريقة ساعدتني على التعلم.
12. قدّمَ المعلّمُ توجيهًا وملاحظات (feedback) ساعدتني على فهم نقاط القوة والضعف لديّ فيما يتعلق بأهداف دروس مادة الفيزياء.
13. قدّمَ المعلم التوجيه والملاحظات لي ولزملائي في الوقت المناسب.
14. التعرّف على زملائي التلاميذ جعلني أشعر بالانتماء في الصف.

[8] This is the translated and adapted students' version of the community of inquiry survey.

15. تمكّنتُ من تكوين انطباعات معينة عن بعض زملائي في الصف.

16. التواصل الصفي (تبادل المعلومات والآراء) هو وسيلة ممتازة للتفاعل الاجتماعي.

17. شعرت بالراحة أثناء المشاركة في النقاشات الصفية.

18. شعرت بالراحة أثناء التفاعل مع زملائي في الصف.

19. شعرت بالراحة في الاختلاف بالأجوبة والرأي مع زملائي في الصف مع استمرار شعوري بالثقة بزملائي.

20. شعرت أنّ زملائي في الصف قد أخذوا وجهة نظري (رأيي) بعين الاعتبار.

21. تساعدني المناقشات الصفية على تنمية حس التعاون.

22. المسائل التي طُرِحت (تمّت مناقشتها) في الصف زادت من اهتمامي بمواضيع دروس مادة الفيزياء.

23. الأنشطة التعلمية في صف الفيزياء أثارت فضولي لأتعلم وأعرف أكثر.

24. شعرت بالحافز (شعرت أنني متشجّع) للتعمّق في فهم الأسئلة المتعلّقة بمواضيع دروس مادة الفيزياء.

25. لقد استخدمت مجموعة متنوعة من مصادر المعلومات للتعمّق في فهم المسائل المطروحة في دروس الفيزياء (مصادر متنوعة أي غير الكتاب المدرسي وشرح الأستاذ، مثل الأصدقاء، الاهل، اليوتيوب، الويكيبيديا، الانترنت، الكتب..).

26. العصف الذهني (المناقشات الجماعية لانتاج الأفكار Brainstorming) والعثور على معلومات ذات صلة بالدرس ساعداني في حل أسئلة تتعلق بدروس الفيزياء.

27. المناقشات الصفيّة ساعدتني على تقدير وجهات النظر (الآراء) المختلفة.

28. الجمع بين المعلومات الجديدة التي تعلّمتُها ساعدني في الإجابة عن الأسئلة التي أُثيرت (طُرِحت) في أنشطة الدروس.

29. ساعدتني الأنشطة التعلمية في تكوين تفسيرات / حلول.

30. التفكّر(التأمّل) في مواضيع الدروس والمناقشات الصفية ساعداني لأفهم المواضيع الأساسية في دروس الفيزياء.

31. لقد توصّلتُ إلى معرفةٍ (معلومات مترابطة knowledge) من خلال دروس الفيزياء، و يمكنني أن أصِفَ طُرقًا لاختبار وتطبيق هذه المعرفة في أنشطة لا تتعلّق بدروس الفيزياء.

32. لقد قُمتُ بتكوين حلولٍ لمسائل دروس الفيزياء يمكن تطبيقها في الممارسة العملية.

33. يمكنني تطبيق المعرفة (Knowledge)، التي توصّلت إليها من خلال دروس الفيزياء، في أنشطة غير متعلقة بصفّ الفيزياء.

APPENDIX D

TEACHER'S VERSION OF THE COMMUNITY OF INQUIRY SURVEY[9]

Based on your experience as a teacher of the seventh grade, indicate your level of agreement with the following statements.

1. I clearly communicated important lesson topics.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. I clearly communicated important lesson goals.
3. I provided clear instructions on how students can participate in lesson learning activities.
4. I clearly communicated important due dates/time frames for learning activities with the students.
5. I was helpful in identifying areas of agreement and disagreement on lesson topics that helped students to learn.
6. I was helpful in guiding the students towards understanding lesson topics in a way that helped them clarify their thinking.
7. I helped to keep students engaged and participating in productive dialogue.
8. I helped keep the students on task in a way that helped them to learn.
9. I encouraged students to explore new concepts in the physics lessons.
10. My actions reinforced the development of a sense of community among students.
11. I helped to focus class discussions on lesson-relevant issues in a way that helped the students to learn.
12. I provided feedback that helped students understand their strengths and weaknesses relative to the lesson's goals and objectives.
13. I provided feedback to students in a timely fashion.
14. Getting to know their classmates gave students a sense of belonging in the class.
15. Students were able to form distinct impressions of some of their classmates.
16. Classroom communication is an excellent medium for social interaction.
17. Students felt comfortable participating in the lesson discussions.
18. Students felt comfortable interacting with other students.
19. Students felt comfortable disagreeing with their classmates about physics-related topics/questions/answers while still maintaining a sense of trust in each other.
20. Students felt that their point of view was acknowledged by their classmates in the physics class.

[9] This is the adapted teacher's version of the community of inquiry survey.

21. Classroom discussions help students to develop a sense of collaboration.
22. Problems posed in the physics classroom increased students' interest in lessons issues.
23. Physics lesson activities piqued (triggered) students' curiosity to learn more.
24. Students felt motivated to explore lesson content-related questions in the physics class.
25. Students utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons.
26. Brainstorming and finding relevant information helped students resolve content-related questions.
27. Classroom discussions were valuable in helping students appreciate different perspectives.
28. Combining new information helped students answer questions raised in lessons activities.
29. Physics learning activities helped students construct explanations/solutions.
30. Reflection on lesson content and discussions helped students understand fundamental concepts in this class.
31. Students can describe ways to test and apply the knowledge created in the physics lessons.
32. Students have developed solutions to physics problems that can be applied in practice.
33. Students can apply the knowledge created in this lesson to non-class related activities (e.g., real-life activities outside school).

APPENDIX E

INTERVIEW QUESTIONS

Teacher's Interview Questions

Cognitive Presence

1. Do you think students find the physics classes you teach interesting? What in particular do you think interests them? How can you tell?
2. Do you think that problems/topics posed in the classroom motivate students to explore and engage in discussion about questions/problems posed in the physics classroom?
3. Do you think that students use multiple resources to understand physics topics? What sources do you think they use and how do they use them?
4. Do the physics lessons taught allow students to apply their learning outside the physics class, such as in another class or at home? How?

Social Presence

5. Do you think students have the opportunity to get to know other students in the class when they are in the classroom? What are those opportunities?
6. Do you feel that students are comfortable participating (and disagreeing) in lesson discussions?

Teaching Presence

7. What do you do to explain lessons, lesson goals, and due dates clearly? How successful do you think you are?
8. How do you encourage students to explore new concepts in the physics lessons? How successful do you think you are in this?
9. Do you provide feedback to your students in a reasonable time? Give an example of a time when you provided/didn't provide feedback to you and how did this affect students' learning?

Teacher's attitudes toward the approach to language use and toward translanguaging

10. What is the school policy regarding the language of teaching and learning of science? How do you feel about that?
11. What language do you use in the classroom? What language(s) do your students use?
12. How do you feel regarding the use of Arabic/English in the teaching and learning activities?
13. Do you feel that the use of Arabic/English impacted students' understanding and communication with you and with their classmates? How?
14. Do the other science teachers use /allow you to use Arabic in the classroom? Why? How do you feel about that?

15. Do you think it is right that English is used to teach science and not Arabic? (Opinion about curriculum)

Students' Interview Questions

Cognitive Presence

1. Do you find physics lessons interesting? Can you give an example and explain why that was interesting? (easy, challenging, too difficult, interesting, etc.)?
2. Do you feel motivated to explore and engage in questions/problems posed in the physics classroom?
3. Do you use various resources to understand physics lessons? What do you do in case you didn't understand a question or a topic? Do you use other resources to better understand a question or a topic?
4. Were you able to apply any of your learning outside the physics classroom (e.g., in another class or at home)?

Social Presence

5. Do you think you have the opportunity to get to know your colleagues when you are in the classroom? What are those opportunities?
6. Do you feel comfortable participating in lesson discussions?
7. Do you feel comfortable disagreeing with your classmates about physics lesson-related issues?

Teaching Presence

8. How clearly does your physics teacher explain lessons? How clear is he in communicating the goals of a lesson and the due dates of activities?
9. Does the teacher encourage you and other students to participate in the class discussion? Elaborate.
10. Does the teacher provide feedback to you in a reasonable time? Give an example of a time when the teacher provided/didn't provide feedback to you and how did this affect your learning?

Attitudes toward the Approach to Language Use in the Classroom

11. What language(s) does the physics teacher use in the classroom? What language(s) do you use?
12. How do you think this impacted your learning?

Attitudes Toward the Use of Translanguaging

13. How did you feel regarding the use of TL (use of Arabic along with English) in the teaching and learning activities?
14. Do you feel that the use of TL impacted your understanding and communication with your classmates and teacher? How?
15. Do the other science teachers use /allow you to use Arabic in the classroom? Why? How do you feel about that?
16. Do you think it is right that English only is used to teach science and not Arabic?

APPENDIX F

MAPPING INTERVIEW RESPONSES TO COI SURVEY RESPONSES

Table 25

Mapping the Teacher's Responses in the Interview to His Responses to the Relevant CoI Survey Items

Presence	Addressed CoI Survey Item(s)	Score	Response to the Interview Questions
CP	Problems posed in the physics classroom increased students' interest in lesson issues.	5	"Yes, of course! Especially when we start with electricity.. Samer and Ibrahim who were nothing in class [weren't cognitively present] and didn't interact with me at the beginning of the school year, are now solving exercises on the board! They told me that they have been watching YouTube videos about physics... they said [they are participating now in class discussions] because physics has become interesting especially when they started learning about electricity."
	Students felt motivated to explore lesson content-related questions in the physics class.	5	"We are still studying simple topics; we can't increase the dose and teach more challenging topics. Yes, we started with mechanics and an introduction to electricity. I do not think students can handle more than this. It is still too early for them to explore challenging topics. I think the curriculum is deep enough for them at this stage… [but] yes, sure. Sure [students feel motivated to explore lesson content0related question]."

	Students utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons?	3	"Usually. some students, like the ones I have just told you about, they watched videos on YouTube."
	Students can apply the knowledge created in this lesson non-class related activities (e.g., real-life activities outside school).	3	"Yes! Sure. In electricity, the grouping. For example. when in the remote control we can't put two cells. one in the direct direction and one in opposition. We say they [the batteries] are in opposition to each other. Otherwise, the remote control doesn't function.
SP	Getting to know their classmates gave students a sense of belonging in the class.	5	"Students already know each other. The school doesn't accept new students from other schools. Students already know each other from primary school" "In case there were new students, then maybe but not much. If you say civics [or] Arabic literature, I would say maybe but in physics, students can't get to know each other enough in the classroom."
	Students felt comfortable participating in the lesson discussions.	4	"Yes. Sure. but students differ. Rama for example, you feel she is too shy, you can't put her under pressure and ask her to solve a question on the board… I try to motivate her and break the ice between us, so she feels more comfortable communicating with me in class."
	Students felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	4	"Yes, some students feel shy or hesitant to share their thinking in class, but in my class no, this doesn't happen. After some time, they [students] become less shy, and they don't feel afraid [of sharing wrong or uncertain solutions]".
TP	I clearly communicated important lesson goals.	5	"Each lesson has its own goals written at the very beginning [on the textbook]. I either read them [the goals] for them [the students] or we write

			them on the board. And if any of the goals was covered before [in prior lesson], I link to it.”
	I clearly communicated important due dates/time frames for learning activities with the students. – delete this item	5	“I tell them [the students] how much time they have for a quiz or a test, but I can’t be sure of the time a lesson needs to be fully covered. I can’t be sure because more than once, I entered the class with a plan and then one question [from a student] takes me [takes the discussion] to an unplanned conversation… I can’t tell them that this lesson will end within this duration”
	I helped to keep students engaged and participating in productive dialogue.	5	“I ensure that all students participate almost each session by assigning roles by turn. If I see someone gazing off, I engage him and attract his attention.”
	I provided feedback that helped students understand their strengths and weaknesses relative to the lesson’s goals and objectives.	5	“Yes. Yes… I should check up the student’s response so that he knows whether it [his response] is it is wrong to avoid making the same mistake in the future. A student” may incorrectly pronounce a word, develop a wrong conclusion, bring wrong information from his research. Therefore, by it [receiving feedback] he knows how to become more specific.”

Note. The underlined phrases are translations of what was uttered in Arabic

Table 26

Mapping Asma's Responses in the Interview to Her Responses to the Relevant CoI Survey Items

Presence	Addressed CoI Survey Item(s)	Score	Response to the Interview Questions
CP	Problems posed in the physics classroom increased my interest in lesson issues.	4	"Yes, <u>they [the physics problems] allow me to know how to use electricity at home."</u>
	I felt motivated to explore lesson content-related questions in the physics class.	4	"Yes. a lot.. there are specific lessons that are kind of hard, <u>but the teacher simplifies them for us.</u> The electricity lesson, they are interesting."
	I utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons.	3	"Yes, I have my sister's textbook at home [grade 9 textbook]. Sometimes I refer to it. I check if I can solve any part in the question." "[if there is something that I don't understand], I ask the teacher about it and I refer to my notes. Sometimes I refer to the physics textbook of the 9th grade." "I use Google Translate to und..understand the meaning of words or ask I ask my sister."
	I can apply the knowledge created in this lesson non-class related activities (e.g., real-life activities outside school).	2	"Yes. But I don't have the materials to apply"
SP	Getting to know my classmates made me feel a sense of belonging in the class.	3	She already knows her classmates since 5th grade. She assumes that the physics sessions should be for learning rather than socializing. she made social relationships with her classmates and developed a sense of belonging to the group because of being with the same group in previous grade levels.

	I felt comfortable participating in the lesson discussions. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	5 4	"[Nodding yes]. It is fine if my answer was different [from my classmate's answer]. My colleagues and I learn from this [variability in responses]". She also shared an example.
TP	The teacher clearly communicated important lesson goals. The teacher clearly communicated important due dates/time frames for learning activities with the students. – delete	4 3	"Yes." "Not always."
	The teacher helped to keep students engaged and participating in productive dialogue.	3	"Yes."
	The teacher provided feedback that helped students understand their strengths and weaknesses relative to the lesson's goals and objectives.	5	"Yes, he tells us if we have something wrong. When I have good understanding of the lesson, there is no need for feedback"

Table 27

Mapping the Maria's Responses in the Interview to Her Responses to the Relevant CoI Survey Items

Presence	Addressed CoI Survey Item(s)	Score	Response to the Interview Questions
CP	Problems posed in the physics classroom increased my interest in lesson issues.	3	"Yes.. There is a lot of practice [in the class/book], but I wish that there is more...like exercises in the book. The exercises in the book are really short [laughing a bit]. I feel we need more.. to get more knowledge"
	I felt motivated to explore lesson content-related questions in the physics class.	3	"Yes.. Umm..<u>the way the teacher explains [lessons] motivates us.</u> <u>But</u> he really helps. He's really kind. And he even sometimes make it like very very super easy .. The topics."
	I utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons.	3	"'Rarely. [If I don't understand something], I re-read the points, re-read the lesson, re-read the points that Mr. Khalil told me. And if I didn't understand, I wait till I go to school and I ask him about it… sometimes like, very rarely, I ask Google. And sometimes I ask Leen, she is the [student] coordinator [of the classroom]"
	I can apply the knowledge created in this lesson non-class related activities (e.g., real-life activities outside school).	3	"<u>It is contingent.</u> Not much but maybe"
SP	Getting to know my classmates made me feel a sense of belonging in the class.	5	"<u>Yes.. I have been with them [for] like more than three years."</u>

	I felt comfortable participating in the lesson discussions.	3	"I have social anxiety… something like you around a lot of people. Like being.. Talking face-to-face to somebody because you get really nervous, and you don't know how to talk."
	I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	3	"No. [I feel] a little bit weird. If the teacher said it is right said it's right, ok, and this stuff, I'll get more comfortable.. If I have a different answer, sometimes I say it"
TP	The teacher clearly communicated important lesson goals.	3	"Sometimes he said this is the goals of the lesson and he actually obeys them."
	The teacher clearly communicated important due dates/time frames for learning activities with the students.	4	"We don't really do activities like application stuff but yes he tells us. we have Homeworks he says it's due to 24-5 [May 24] or something."
	The teacher helped to keep students engaged and participating in productive dialogue.	3	"Yes. Sometimes like if I get nervous to say my answer or it's like changed. If I change my answer and I think it's right or no. like I raise my hand to answer but I don't say my answer. He actually motivates us to say it some of them [classmates] makes fun of us [when I say a wrong answer]." "[The teacher motivates others to participate in class discussions] but there is a lot of +… like those who make noise, he get really annoyed of them. Sometimes [laughing] he just starts shouting on them… Maybe the teacher could make them participate more if he talks to them, so they stop annoying him [laughing]… when the teacher shouts at them, you feel there are many interruptions in the class [discussion]. We can explain many point[s], but we are being distracted."
	The teacher provided feedback that helped students understand their strengths and weaknesses relative to the lesson's goals and objectives.	3	"Yes. Sometimes."

Table 28

Mapping Jana's Responses in the Interview to Her Responses to the Relevant CoI Survey Items

Presence	**Addressed CoI Survey Item(s)**	**Score**	**Response to the Interview Questions**
CP	Problems posed in the physics classroom increased my interest in lesson issues.	5	"Yes, because I like physics"
	I felt motivated to explore lesson content-related questions in the physics class.	5	"Yes. A lot."
	I utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons.	5	"Yes. [When I encounter a challenging idea] I ask the teacher. If I were at home, I ask my brother.. I read the lesson; I do research on YouTube."
	I can apply the knowledge created in this lesson non-class related activities (e.g., real-life activities outside school).	5	"There are common lessons in chemistry and physics. There is solids and liquids and beakers.. I apply physics at home. The on/off switch [pointing to the fan], the voltage of the lamp, you can know how much a lamp needs [to function normally]."
SP	Getting to know my classmates made me feel a sense of belonging in the class.	5	She nods yes.

	I felt comfortable participating in the lesson discussions.	5	She nods yes when asked whether she feels comfortable participating in class.
	I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	4	"I don't feel shy to say my wrong answer. [I need to say my answer] for the teacher will correct it if it was wrong… If the teacher is looking at me indicating that my answer is correct, I say it again."
TP	The teacher clearly communicated important lesson goals.	4	"Yes, the teacher starts each lesson, with a summary"
	The teacher clearly communicated important due dates/time frames for learning activities with the students.	5	"If they [students] ask him [he shares timeframes]" She nods yes when asked if he communicates the timeframes and due dates with her when she asks.
	The teacher helped to keep students engaged and participating in productive dialogue.	5	"Not always. It is usual"
	The teacher provided feedback that helped students understand their strengths and weaknesses relative to the lesson's goals and objectives.	5	"Yes."

Table 29

Mapping Amer's Responses in the Interview to His Responses to the Relevant CoI Survey Items

Presence	Addressed CoI Survey Item(s)	Score	Response to the Interview Questions
CP	Problems posed in the physics classroom increased my interest in lesson issues.	4	"Physics is beautiful [subject], but I don't like science. I only like biology, the life sciences. I don't feel inclined to electricity and such stuff. Physics lessons are all the same for me."
	I felt motivated to explore lesson content-related questions in the physics class.	3	"Maybe. The physics textbook, I honestly don't like it. It [includes] exercise only [direct applications]. It doesn't tell us how we can benefit from the exercises.. I am interested in knowing how much effort a person [inventor] exerts to invent the thing [we are studying]. We see this thing [invention] as think that it is just like any other thing, but maybe this person struggled for more than ten years to make it… I wish it [the textbook] included information about the inventor of the thing we are learning about, why he invented it, what his goal was, and why."
	I utilized a variety of information sources (other than the teacher and the textbook, e.g., YouTube, Wikipedia, internet, other books, parents, etc.) to explore the problems posed in physics lessons.	1	"Yes, [I watch YouTube videos] about physics lessons, particularly about inventions, who invested them, how, and why… but I seldom do so.. If I have a question, I ask the teacher."

	I can apply the knowledge created in this lesson non-class related activities (e.g., real-life activities outside school).	1	"'Maybe. There are inscriptions on the lamp that tells the voltage it needs.. The teacher told us it needs to be provided with the same value of voltage inscribed on it. I don't think there is anything else that I learned in the physics class that I can apply or benefit from in daily life."
SP	Getting to know my classmates made me feel a sense of belonging in the class.	5	"The group work that we once did, I became friends with one classmate. We started talking more often since then.. it was the only time we had group work in the physics class. I prefer to have group work every 2-3 sessions since collaborative work is more productive.."
	I felt comfortable participating in the lesson discussions.	4	"Yes, I have a shy character but in class I feel comfortable with people I like. I feel I have high confidence I participate I participate without being shy. I am the kind of a person who easily makes friends, helps friends. They tell me that I am popular at school."
	I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	2	"Yes, I feel comfortable [sharing a different answer]. I feel confident. I have to be confident and argue for my point of view. Maybe I was right.. if they didn't like my point of view, I will keep it for myself… I need to make sure of my answer before I say it. I can't say it spontaneously, maybe it is wrong… I ask the teacher about my uncertainty and if he assures my answer, I share it."
TP	The teacher clearly communicated important lesson goals (objectives).	4	"Yes. Before he [the teacher] starts with a lesson, he tells us what it is about and what its goals are."
	The teacher helped to keep students engaged and participating in productive dialogue.	4	"He [the teacher] motivates me."

	The teacher provided feedback that helped students understand their strengths and weaknesses relative to the lesson goals and objectives.	4	"[nodding yes]. Sometimes I share a correct answer or a wrong answer, he says it is fine, try again. But when I have a correct answer he says Bravo, you are focusing. He says bravo you did well."

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