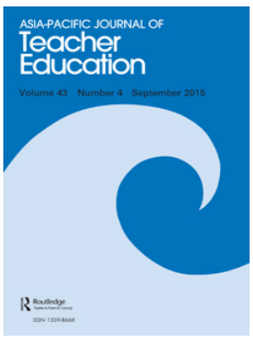

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Using cogenerative dialogues to improve coteaching for language learner (LL) students in an inclusion science classroom

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This paper presents findings from a study conducted in an urban elementary school in the United States with an English language learner (ELL) student and two teachers engaged in collaborative teaching in an inclusion science classroom. This study examines the efficacy of utilising cogenerative dialogues between an ELL student and his science teacher and English as second language teacher to improve instructional practices enacted during coteaching. Drawing from field notes, teacher and student interviews, and video captured during cotaught science lessons and during cogenerative dialogues between the student and his coteachers, we examined the ways in which cogenerative dialogue expands teachers' agency to adapt curriculum and implement instructional strategies that can better meet the needs of their students. At the same time, we examined the ways in which participation in cogenerative dialogues with his teachers expanded this student's agency as a science learner and a language learner.

Keywords: cogenerative dialogues; coteaching; language learner (LL) students; multilingual research; science teacher education

Introduction

In an effort to help content area teachers meet curricular and instructional goals while also supporting students' academic language needs, many schools in the United States encourage content area teachers to engage in collaborative teaching with English as second language (ESL) teachers to enhance instruction for English language learner (ELL) students. Such collaborations have resulted in many districts "moving away from pull-out approaches … in favor of push-in, or coteaching models" (McClure & Cahnmann-Taylor, 2010, p. 102), whereby two teachers work to integrate content and language instruction in the same lesson. This shift towards *inclusion models* of instruction enable school districts to compensate for the shortage of ESL-trained teachers in US schools and helps school administrators respond to federal legislation, such as the No Child Left Behind Act (2002) and the Individuals with Disabilities Act (2004), which hold schools accountable for ensuring that ELL students have access to the same curriculum as other students while still receiving the specialised language instruction to which they are entitled. Thus, coteaching between content and ESL teachers is becoming more common and there is a growing need for content and ESL teachers to be able to effectively share responsibility for instructing ELL students.

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Over the last two decades, there has been a growing body of research focusing on collaborative teaching involving special education and content area teachers (Scruggs & Mastropieri, 2007). These studies have generally found coteaching benefits these teachers professionally with regard to improved content knowledge, classroom management, and adaption of curriculum (Austin, 2001). In addition, coteaching has been reported to be an effective tool for sharing responsibility for both instructing general education students with special needs and increasing opportunities for student and teacher interactions (Buckley, 2005). Unfortunately, there is relatively little research examining this kind of collaboration between content teachers and ESL teachers and no studies have examined the effectiveness of collaborative teaching strategies in supporting language learner (LL) students to learn specific content, such as science (Friend, Cook, Hurley-Chamberlain, & Shamberger, 2010).

Most studies examining collaborative teaching between content area teachers and ESL teachers have focused on providing descriptions of the models (Dove & Honigsfeld, 2010) rather than examining the effectiveness of different teaching models (Pawan & Ortloff, 2011). While there are several texts and resources available that prescribe strategies for teaching science content for LL students (e.g. Fathman & Crowther, 2006) or how to integrate language teaching and science content (e.g. Echevarria, Vogt, & Short, 2010), studies focusing specifically on enhancing dialogue between ESL and science teachers that support them to effectively co-plan and collaboratively instruct LL students to successfully access and understand the science content are needed (Davison, 2006; Dove & Honigsfeld, 2010). To learn more about the challenges teachers and students face in language inclusive science classrooms, we think it is imperative to not only engage coteachers in dialogue but also the students they collectively serve.

To this end, we introduce a collaborative teaching model designed to engage a science teacher, an ESL teacher, and an ELL student in co-planning and co-enactment of science lessons, followed by co-reflection using a structured discourse method called cogenerative dialogues (Roth & Tobin, 2001, 2002) – all aimed at transforming coteaching practices in an inclusion science elementary classroom. This approach to collaborative teaching differs from other models (Martin, 2009) in that it encourages teachers to regularly engage students from their class in dialogue about how the co-taught lessons impact student learning. Cogenerative dialogues are conversations between teachers, students, and researchers that are designed to support the teaching and learning that takes place in a classroom (Tobin & Roth, 2006). The purpose of these dialogues is to foster positive relationships among coteachers (Roth & Tobin, 2002) and between teachers and their students (Elmesky & Tobin, 2005; Martin, 2006) while improving instructional practices among teachers (Martin & Scantlebury, 2009; Siry, 2011) and developing students' and teachers' understandings about content and how to engage in productive teaching and learning (Bayne & Scantlebury, 2013).

For the purpose of this paper, we explore how utilising cogenerative dialogues between an ELL student and his science teacher and ESL teacher led to the enactment of more effective instructional practices during coteaching. As such, we illustrate how cogenerative dialogues can improve a teacher's understanding of a student's academic, linguistic, and social learning needs, which can support the teacher to more effectively co-plan and implement instructional strategies that can expand opportunities for students to learn science while also developing language. Finally, we highlight how engaging ELL students in cogenerative dialogues with their teachers can improve a student's understanding of the different roles each individual teacher plays while coteaching in inclusion classrooms.

Our focus differentiates our study from previous work on coteaching and cogenerative dialogues and offers new insights into the applicability of this model in more diverse settings. The findings from this research offer implications for how to improve coteaching between content and ESL teachers in ways that expand learning opportunities for LL students that has the potential to reposition LL students as a valuable resource for improving their own educational experiences. In sharing this research, we hope to draw attention to the need for teachers and researchers to engage LL students, not only as participants in classroom-based research, but also as co-researchers who are positioned to voice their concerns and suggestions about how to improve science and language learning opportunities for themselves.

Theoretical framework

Our framework for thinking about teaching and learning is grounded in a sociocultural perspective (Sewell, 2005), meaning we view teaching and learning as forms of culture that are enacted as practices that can be observed as teachers interact with one another and with their students. Central to this view of culture is the notion that practices are shaped by beliefs and attitudes (schema) which are, in turn, shaped by a person's access to resources needed to mutually sustain these schema. Resources exist as non-human materials, such as laboratory equipment or chalkboards, or human materials as knowledge about science content or second language acquisition theories. Schema and resources exist as structures within social fields (Bourdieu, 1992). These structures can afford or constrain a person's ability to access and appropriate the resources needed to meet their goals, resulting in a person being agentic or not. However, a central tenet of cultural sociology is that structures (schema and resources) are held in a dialectical relationship with agency (a person's power to enact practices to meet ones goals), meaning that while structures can shape a person's agency, a person's agency can also shape structures (Roth, 2005; Sewell, 2005).

Using this structure|agency dialectic as a lens for examining the enactment of teaching practices during co-taught science lessons enables us to identify structures (in the form of schema and resources) that may support or hinder individual teachers' (science and ESL) agency to enact practices that could expand science and language learning opportunities for ELL students during coteaching. By focusing explicit attention on the ways in which coteaching, structured by cogenerative dialogue, may increase each teacher's awareness (schema) of the difficulties LL students may experience when learning science content in inclusive classroom settings, we examined the ways in which cogenerative dialogue expands teachers' agency to adapt curriculum and implement instructional strategies that can better meet the needs of their students. At the same time, we examined the ways in which participation in cogenerative dialogues with his teachers expanded a LL student's agency as a science learner and a language learner.

Mode of inquiry

This research utilised critical ethnography (Carspecken, 1996) combined with cogenerative dialogue to give meaning to the lived experiences of participants (Siry & Lang, 2010) while supporting participants to identify structural constraints that limited participants' agency with a goal of catalysing changes in structures that support participants to be able to access and appropriate resources to meet their individual and collective goals. This combination of critical ethnography and

cogenerative dialogue provides for the development of collective responsibility and can lead to the implementation of new practices based on the voices of both teachers and students (Roth, 2005). In this study, cogenerative dialogues offered participants a structural resource for enacting new cultural practices in which the science and ESL teacher and an ELL student came together to articulate their individual-held beliefs about how to improve teaching and learning in this inclusive elementary science classroom.

Structured by rules, cogenerative dialogue encourages teachers and students to engage in equitable turns at talk while positioning each participant as an advocate for the needs of themselves and others (Lavan & Beers, 2005). These rules are underpinned by Guba and Lincoln's (1989) authenticity criteria suggesting that for research to be ethical it must be ontological, educative, catalytic, and tactical. In this study, cogenerative dialogues served as a methodological framework, ensuring our research was *ontological* in that all participants were positioned to learn about themselves. By replaying video captured during the science lessons during the cogenerative dialogues, researchers focused teacher and student attention on unconscious practices or unnoticed interactions (Martin, 2009). Examining the video in the context of cogenerative dialogues ensured that the research was *educative* as all participants were encouraged to discuss their individual perspectives about what they noticed in the video and to educate others by sharing what they understood to be happening.

During these dialogues, participants had an explicit goal to consider the roles and responsibilities teachers and students each have for ensuring that productive science teaching and science learning occurs (Siry, 2011). By adhering to this general concept, the researchers engaged participants in this study in collective analysis and interpretation of teacher and student practices enacted during science teaching and learning (Martin & Scantlebury, 2009). This combination of critical ethnography and cogenerative dialogues supported participants to identify practices that hindered teaching and learning so as to diminish or eliminate the practice (Siry & Martin, 2014). Alternatively, practices identified as beneficial were strengthened. In this way, the dialogues were *catalytic* in nature. Finally, we attended to the criteria of *tactical* authenticity by sharing in the responsibility to enact changes as a collective rather than only at the individual level. In considering these criteria, we sought to articulate and educate one another about our understandings while catalysing improvements in the teaching and learning in this inclusive science classroom. Thus, these criteria served as structural guides for our data collection, analysis, and interpretation processes.

Context and data collecting

This study was conducted at a public school located in a socio-economically depressed neighbourhood in a large city in the northeastern United States. Among the school population, about 24% were identified as "Limited English Proficient" and 90% of students were eligible for free or reduced lunch. As this study involved direct contact with student participants, the Institutional Review Board of City University of New York monitored all procedures, including teacher and parental consent and student assent processes and data collection. We provided appropriate translated versions for non-English-speaking parents and students and orally explained all ethical issues to participants before commencing the study. In concordance with guidelines for conducting ethical research, we use pseudonyms for all participants.

Data in this study were collected in a fifth grade co-taught science lessons by one science teacher (*Jane*) and one ESL teacher (*Ben*) and one ELL student (*Isaac*). Jane, self-identified as Korean-American, is a veteran teacher with 20 years' experience teaching science to gifted and ELL students. Ben is a certified ESL teacher who instructs students in independent ESL classes and by coteaching in inclusion classrooms with content area and grade-level teachers. Isaac, a Korean immigrant boy, had been living in the United States for only 2 months at the start of this study. He showed basic proficiency level for reading and writing English at a fifth grade level, but scored below basic proficiency in listening comprehension and speaking.

Sungmin attended the co-taught science classes as a participant observer every week over a 5-month period. During this period, Sungmin established a steady presence in the classroom and gathered observational data about student and teacher practices. Sungmin also wrote analytical memos to describe individual and collective practices and dialogue for each lesson. Sungmin regularly engaged in pre- and post-class interviews with the co-teachers to discuss various aspects of their planning and reflections on their lesson implementation.

Video data for this project were collected during a discrete 12-week period. During this time, Sungmin video recorded one 45 minute science lesson per week, then wrote an analytical memo for the lesson to help us reduce the data and guide their interpretation. Each week we discussed salient events identified in each memo and then collectively viewed the videos and identified vignettes that were most representative of patterns of coherence and contradiction across the data set. These events were selected and edited into short video segments (30–120 seconds long).

Sungmin then shared the selected video clips as prompts for participant discussion during weekly cogenerative dialogues. Each cogenerative dialogue lasted about 30 minutes and was also video recorded (Figure 1).

Prior to the first cogenerative dialogue, Sungmin explained the purpose of the research and explained the authenticity criteria to all participants in both English and Korean. During the cogenerative dialogue, a mix of both English and Korean was used to equitably engage all participants. Throughout the cogenerative dialogue, participants were reminded about the authenticity criteria and were supported to focus their efforts on sharing their perspectives and working to collectively co-generate suggestions for improving teaching and learning after each meeting. Upon concluding each cogenerative dialogue, the participants agreed upon different practices they would individually be responsible for implementing during the upcoming week in an effort to catalyse changes in their teaching and learning. During the next week, Jane, Ben, and Isaac implemented various changes during science class, which would be recorded and discussed in the next cogenerative dialogue.

Following each cogenerative dialogue, Sungmin wrote analytical memos describing individual and collective practices that took place during the dialogue. During each subsequent week, participants focused attention on evaluating the effectiveness of the changes they implemented since the last meeting. This cycle continued each week over a 12-week period.

At the end of the 12-week period, all selected video segments were transcribed in Korean and then translated into English by Sungmin. We conducted conversation analysis on all data, analysing talk and examining the interactions of participants. All transcripts and personal analytical memos were shared with Sonya and the classroom participants for member checking and collaborative analysis.

Figure 1. (a) Cogenerative dialoguing with sharing the selected video clips. (b) An example of the selected vignettes showing co-taught science lesson with Jane, Ben, and Isaac.

Analysis

This study was designed using emergent design approach (Brown, 1992) which allowed the focus of our analysis to evolve as the process unfolded based on the issues that Jane, Ben, and Isaac identified as salient for improving their science teaching and learning experiences. The data sources included video of weekly science lessons and cogenerative dialogues and associated analytical memos, interviews with each participant, lesson plans, student work, and transcripts of the science lessons and cogenerative dialogues. Conversation analysis was used to analyse talk and gestures to support our examination of participant interactions over time and to support our attempts to make sense of participants' talk and interactions (Roth, 2005).

Based on the shared data sources including video clips and analytic memos, we engaged in collaborative interpretive analysis using microanalysis of video and audio. We repeatedly replayed the video clips focusing on what was happening during the event, how participants experienced teaching and learning, and how they made sense of the experiences. In an effort to describe and explain what emerged as a result of engaging teachers in video-based cogenerative dialogue with their students, we have purposefully selected data representative of patterns we identified across all of the data. To do this, we adapted Sewell's structure|agency framework to examine each participant's enactment of science and language teaching and learning practices during science classes and cogenerative dialogues.

In this paper, we focus on the efficacy of using cogenerative dialogues to inform coteaching in inclusive science classrooms. Our analysis revealed three major findings: (1) cogenerative dialogues supported teachers to expand the agency of their student by supporting the student to learn about the roles his teacher played in his learning and helping him to appreciate the value of their individual and collaborative practices, (2) cogenerative dialogue expanded the agency of teachers in that it supported teachers to identify students' cultural and linguistic differences as both a resource and a constraint, and (3) cogenerative dialogue made a social space for developing relationships that fostered solidarity among participants which helped strengthen teachers' commitment to work to support their student and strengthened the students' ability to see his teacher as resources for his learning. These findings are important for our work with teachers who wish to engage students in critical dialogue because they show coteaching can improve students' experiences in inclusion education. Also, it implies that when students are seen as valuable participants in their own learning they can help teachers to improve their collaborative teaching practice. To support our argument in this paper, we present a series of episodes representing typical examples from the data that illustrate the findings.

Identifying the role of teachers and the need for change of individual and collaborative practices

Research shows that relative high achievement and good behaviour exhibited by some LL students can sometimes mask the challenges they face in the classroom (Lee, 1997). As a result, teachers may make assumptions about what students know and are capable of doing, which can disadvantage learners. Most content area teachers, such as Jane, have limited coursework preparation about second language acquisition research, which may result in the misinterpretation of ELL students' actions. In an early interview with Sungmin about which students to invite to participate in this study, Jane suggested Isaac as a student of interest for her. Jane expressed some frustration with Isaac who tended to keep his head lowered during lecture and whole class interactions. Prior to engaging in cogenerative dialogue with Ben and Isaac, Jane attributed this practice with a disinterest in science or low motivation. However, during collaborative analysis of video from the first science lesson, Ben offered an alternative assessment of Isaac's behaviour.

Based on his expertise as an ESL teacher, Ben suggested these behaviours were the result of Isaac's limited proficiency in speaking comprehension and listening. Research shows that students with limited listening comprehension may feel the need to "tune out" during part of a lesson to avoid becoming too exhausted or frustrated when trying to make sense of too much oral input. Ben suggested alternative

tasks that could keep Isaac engaged in the lesson while providing additional structures to support his learning. For example, Ben suggested offering Isaac science vocabulary flash cards to review when he needed to "tune out" from listening – but not from learning. Reviewing video during cogenerative dialogue provided Ben and Jane a structure for focusing their awareness on problematic issues and for collectively cogenerating plans for how to address Isaac's needs as a learner. Together, Ben and Jane cogenerated a variety of changes in their instructional activities, examples include changing the pace of lessons by speaking more slowly and clearly, encouraging students to take notes in their native language and then working with Ben during pull-out ESL classes to translate notes to English and reinforce new vocabulary, and using a combination of grouping strategies designed to offer ELL students small group language support and also a chance to be in groups with native English speakers where ELL students can listen to their peers' fluent talk "science talk."

Teachers also benefitted from engaging Isaac in collective analysis and discussion about their student–teacher interactions, which revealed issues that may otherwise have remained hidden. In Episode 1, Isaac is describing Ben's role during co-taught science lessons.

Episode 1

Isaac: Ben usually explains again what the science teacher has said.
Sungmin: So Ben explains what you do not understand?
Isaac: Well sometimes Ben explain something that I already know and . . .for example, uhm . . .there may be something I already fully understand, and just as I am writing down my idea, Ben . . .you know . . .when someone talks [when I'm writing] I forget what I was trying to write . . .so, sometimes it irritates me.

Cogenerative dialogue allowed Isaac to educate his teachers about how he experienced Ben's assistance during science class, which revealed a contradiction in Ben's effort to support Isaac. Ben shared that because the science content was unfamiliar to him, it was difficult for him to effectively modify the lessons to meet the needs of three ELL students in the class, each of whom were at different proficiency levels. In an effort to expand Jane and Ben's agency in the class, the two began meeting prior to class to pre-teach one another the core content, vocabulary, and language support strategies that would be covered in co-taught classes. Additionally, Ben began using a small wipe board to communicate with students during class so students were not tasked with listening to both teachers at once. This method allowed Isaac to accept assistance as needed without breaking his concentration to think, write or listen. These changes in teaching and learning practice imply that all participants became more agentic in that they became more attentive and receptive to feedback from others. This episode is one example of the way in which cogenerative dialogue provided the opportunity for teachers and students to increase their agency by expanding the schema they held about one another. Jane, Ben, and Isaac had limited schema in the form of knowledge about LLs or the role of teachers, but cogenerative dialogues offered a social space for them to gain knowledge about the learner and teachers. This collective reflection created a shared responsibility of learning science.

Identifying student's cultural and linguistic differences as both a resource and constraint

In most classrooms, teachers and students have limited opportunities to engage in dialogue about teaching and learning, which means that when misunderstandings arise they may pass without discussion. However, when students identified as LLs make mistakes or are unable to respond to questions, their teachers may attribute their actions to a cognitive inability rather than to cultural or linguistic differences that prevent the students from being able to access or appropriate the language needed.

The following excerpt is transcribed from a cogenerative dialogue during which Isaac and Sungmin are discussing Isaac's inability to respond to Jane when she asked him to discuss what he observed during a science demonstration. When demonstrating how density affects buoyancy, Jane prompted students to reflect on the behaviour of a diet soda and a non-diet soda when placed in a bowl of water. Jane's demonstration introduced a discrepant event to students who may anticipate the two identically appearing cans should behave similarly. Students are expected to understand that because the artificial sweeteners in diet soda weigh less than sugar the diet soda will float.

Episode 2

Isaac: Ah, this scene. You know? At that time I was very very~ perplexed?
Sungmin: May I ask why?
Isaac: Ah, it was because I didn't understand the question at all.
Jane: You mean you did not understand the meaning of the question itself?
Isaac: Yes. What is "die coke"?
Sungmin: It is "diet coke" – a kind of Cola.
Isaac: What is it?
Sungmin: Have not you heard of "Diet Coke", yet?
Isaac: No, I have not.

In Korea, artificially sweetened drinks are not commonly sold and while Coca-Cola products, like the ones Jane used in the demonstration, are sold in Korea – the name printed on the can is Light Coke, not Diet Coke. Light Coke is not available in most stores in Korea as it is a specialty product, so it is reasonable that Isaac would have had limited exposure to such products. Because he was unfamiliar with the term "Diet Coke," he misheard Jane to say "Die Coke," which confused him even though he reported in the cogenerative dialogue that he had studied about density and buoyancy before. In this case, cogenerative dialogue provided Isaac a venue in which to revisit the moment with his teachers to express not only the reason for his confusion but also to demonstrate his knowledge about the topic.

For Ben, this moment highlighted the need to engage in more focused co-planning with Jane concentrating not only on "content learning objectives and science terminology," but also the need to more carefully consider how cultural differences could shape opportunities for Isaac to access the material. One possibility to help achieve this goal is to pre-teach vocabulary (including names of materials used in activities) during "pull out" lessons with Isaac prior to science class. Had this occurred prior to the demonstration lesson, Jane and Ben could have drawn upon Isaac's cultural experience to educate other students about the

different terms used to describe the same products in different countries and even different attitudes towards those products. Such a conversation could have provided an entry point for other students to draw upon their cultural funds of knowledge in science. We recognise that teachers are not capable of being knowledgeable about the culture and language of all students, but by engaging in analysis and dialogue with professional peers and students, teachers can become more sensitive to the fact that cultural, social, and linguistic differences can both enhance and hinder classroom instructional practices. We promote this model of collaborative teaching and student engagement to develop one's appreciation for opportunities to learn from and across difference in diverse classrooms. Thus, cogenerative dialogue can expand the agency of teachers and students in that it can support them to identify differences and create possibilities for seeing difference as resources for learning.

Social space for developing relationships that foster solidarity

Students who are learning a new language in a new country have a tendency to experience anxiety, apprehension, and nervousness in school (Hashemi, 2011). For students to make meaning and develop language skills, they must feel comfortable enough in the classroom to ask and answer questions and to engage with their teachers and peers. Cogenerative dialogues can create a social space where relationships can be built between teachers and students and where students can discuss affective issues that impact learning. In the following excerpt, we share a moment from cogenerative dialogue in which Isaac burst into tears while recounting how he felt about class before he began engaging in dialogue with his teachers.

Episode 3

Isaac: What needed to change is not a feeling but a kind of thinking. . . Actually at the beginning I was so afraid, worried about how I can manage, I had no confidence in myself. . . [bursting to tears] As I look back, (2 sec) . . . I have come to know much more vocabulary, better writing. . . I have learned a lot and gotten better than before.
Sungmin: However, still, it is hard for you?
Isaac: It's so hard [inaudible due to crying]

At the start of the research, Isaac had limited interpersonal connections with his teachers. After learning about the stress Isaac felt, Jane and Ben decided to enact some changes in instruction to help Isaac feel less alienated in class. Jane offered to facilitate Isaac's entry into whole class discussion by translating his comments into English. Ben agreed this practice could boost Isaac's morale and that it would not be detrimental to his English learning. The following excerpts from two different cogenerative dialogues demonstrate how this change in instructional practice by Jane expanded opportunities for Isaac to participate in science.

Episode 4

Jane: Yes, you should be proud of your excellent Korean. Other students could not express their idea as precisely as you.
Isaac: [smiling and nodding positively]

Episode 5

Jane: [Today during presentation] you had a choice to speak Korean, how did you feel?
Isaac: More and more I feel good to speak Korean in front of other students. You know, it is a special feeling of speaking Korean when other students don't understand what I am saying. It makes me seem more interesting. I will present my ideas more often in Korean.
Jane: Oh?
Sungmin: So, are you worried to present your ideas in English?
Isaac: Actually, as I get accustomed to it, to express my thoughts in short sentences now is okay. When I came, I had tried to speak English in long and correct sentences and it made me very depressed. I was worrying and worrying about it,
Jane: Oh no. [shaking head]
Isaac: But since participating in cogenerative dialogue, I started over.
Sungmin: So, your tactics changed?
Isaac: Yes. Now I speak in short sentences and add more and more. . .
Jane: Yes, now he is so improved. At the beginning of this school year, he was so awkward, like uncomfortable. . .
Sungmin: We can see it in the recorded videos.
Jane: Right . . .there is a smooth transition . . . And I found his interactions with students has improved . . . You might hardly notice presenting your ideas in Korean in the lesson.
Isaac: Right, right
Jane: But after the permission to speak in Korean, you might feel much easier.

Video recorded after Episode 4, Isaac is seen volunteering ideas and questions more frequently and Isaac's peers can be seen nodding in agreement with his answers as Jane translated for him. This practice enabled Isaac to share his cultural capital in the form of science knowledge, which helped him to gain symbolic capital as a student who is "good" in science. In addition, Isaac had occasion to be praised both during class and in cogenerative dialogue for his knowledge and language proficiency – both of which are rare for LL students in school. Smiling and eye contact between Isaac and his teachers and peers are evidence of increased comfort. Described as solidarity, Roth (2007) commented that when students and teachers engage in cogenerative dialogue over time they develop a feeling that they are "in this together," which helps to promote learning. We argue cogenerative dialogues helped to foster empathy for Isaac's challenges and the trust built during ongoing discussion supported Jane and Ben to try new strategies not only designed to improve learning, but also to address Isaac's emotional and social needs in the classroom.

Contradictions and limitations of the study

Despite finding potential in this model, contradictions and limitations were experienced. One limitation had to do with how few students participated in this study and how limited the time was for teachers to meet with one another outside of the classroom and the cogenerative dialogues. As a result, their ability to implement some of the changes they wanted to make was limited by the way in which the administrators scheduled teacher class time and planning time. This finding speaks to a need for structural supports at the school level that will allow more time for teachers to co-plan and engage in cogenerative dialogues with one another and with students. Other contradictions involved teachers' general lack of resources, time, and education to support them to more effectively develop collaborative lesson plans that target conceptual development and language development. More teacher education and professional development is clearly needed to provide teachers with the resources they need to enact the practices they need to be able to enact. In addition, the different languages spoken by the researchers, teachers, and students were both an affordance for this research – and a limitation. That the researcher and the science teacher could both speak Korean and English meant they were able to engage a student with very limited English ability in dialogue about how to better support his learning. Sungmin and Jane's ability to facilitate dialogue between Isaac and Ben provided Ben with more insights into the challenges that Isaac faced – as well as his considerable strengths as a learner. Without the participation of multilingual researchers and teachers in this research, there would be limitations as to who could participate and how effectively the participants could communicate with one another over time. In addition to developing multilingual research teams, researchers and school practitioners could seek more resources from the school community to support students of differing language backgrounds and abilities to communicate effectively in the dialogues with their teacher and even with other ELL students and English-speaking peers. There may be opportunities for students who have passed out of language support services to take on leadership roles in their school that help to facilitate improved communication and learning for ELL students.

Conclusions and implications

This work shows coteaching can be enhanced when teachers use cogenerative dialogue to reflect on the limitations they each face with regard to content-/language-specific knowledge and pedagogy. Engaging content and ESL teachers in video analysis and structured discourse with LL students using cogenerative dialogue offers participants a social space to engage in professional, focused dialogue about instructional practices while offering students and teachers a window from which to view one another's experiences. Engaging in regular reflection helps to create a social space, outside of the classroom, where participants can develop positive relationships. As participants gain trust and confidence through this process, they may develop a sense of solidarity, which supports them to take risks that can lead to improved content and language teaching and learning. In addition, this research found that when teachers provide a social space for LL students to reflect on their own learning experience, LL students could be a valuable resource for their own learning.

Thus, an important implication for this work is that educators and researchers need to do more to engage LL students, like Isaac, to play more active roles in making decisions about their own educations. Rarely are students engaged in research in ways that privileges their

voice or that serves to empower them to make decisions about how they experience the classroom, how they engage with content or even which content they must learn. When students are not engaged in dialogue about their own educational experiences, they are in effect "forced to accept responsibility for the actions of the teacher . . . without being provided access to the knowledge of their responsibility and the opportunity to act on their own behalf" (Stith & Roth, 2006). From this research, we suggest new roles for LL students to serve as co-collaborators with teachers engaging in coteaching aimed to support content and language learning in schools. In this work, one of the researchers and teachers was knowledgeable about Korean culture and language – but this is not always a possibility. Thus, additional research is needed to develop models for effectively engaging students and teachers to come together across different cultural and linguistic backgrounds to successfully utilise the coteaching and cogenerative dialogue model we have shared. Perhaps teachers and researchers can engage community members, parents, and other students (LL and native speakers) to support coteaching initiatives which could simultaneously serve to better educate everyone about the challenges and benefits diversity brings to the school and community.

Although cogenerative dialogue and coteaching has been shown to be an effective tool in classrooms in the United States, Canada, and Australia, this methodology has been applied less frequently in non-Western countries. Thus, little is known about how to utilise coteaching and cogenerative dialogue in countries with different socio/historical/cultural contexts. In countries that have yet to experience wide-scale migration or immigration, addressing the impact on classrooms is of critical concern because there may be limited infrastructure in place to prepare teachers for the challenge. In Korea, for example, gains in immigration and interracial marriage are increasing demands for teachers to expand educational support for Korean language learner students. Because cultural and linguistic diversity is an emerging phenomenon in Korea, teacher education programmes currently do not offer course work on issues like multicultural education, inclusive education, or how to support second language learner students. And while few studies have been done to examine the experiences of these learners, one study found that 56% of multicultural students in Korea report difficulty in school due to their limited Korean language proficiency (Cho, 2006). Thus, we call for research communities in different countries, like Korea, to be become more aware of the value this model of coteaching and cogenerative dialogue offers to support effective instruction between content area specialists and special education or language education teachers. Findings from research in other cultural contexts could expand what we know about coteaching and cogenerative dialogue in diverse cultural settings in any country.

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Sungmin Im's main interests are using qualitative research and sociocultural theories to improve physics teacher education, and he is especially interested in addressing equity issues in science education for students with special educational needs.

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