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Sheltered Math for Emergent Bilinguals: A Case Study of a Novice High School Teacher

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ABSTRACT

Sheltered English Immersion (SEI) is a common instructional approach to serve Emergent Bilingual (EB) students through Content-Based Instruction. However, little is known about how novice teachers implement SEI in their content areas once they enter the profession. This dearth of research is particularly pronounced in math, a content area where research has shown teachers to be prone to neglect the language learning needs of EBs. In this case study, we examine the perceptions of and the implementation of SEI by a novice mathematics teacher who had completed a single SEI course during her teacher education program. The findings showed that the teacher implemented some SEI strategies well, such as teaching vocabulary and modifying her instructional materials with visuals, color-coding, and guided notes. However, she struggled to chunk information for her students and did not engage them in extended mathematical discourse or promote translanguaging in home languages. The study shows that a single SEI course does not provide sufficient tools for a novice teacher to fully meet the needs of EBs. Implications for teacher education and research are discussed.

1 | Introduction

U.S. schools continue to experience growth in their Emergent Bilingual (EB) student population, including 5 million classified English Learners (ELs) and other students who grow up using a language other than English (National Center for Education Statistics 2021). However, research has demonstrated that EBs are underserved in content classrooms and that teachers' preparedness to address EBs' needs is generally low (Faltis and Valdés 2016; Gandara and Contreras 2009; Johnson et al. 2018; Menken 2013). Content area teachers often do not view the education of EBs as their responsibility (Chval et al. 2015) and tend to lack an understanding of the disciplinary language of their subject areas (Erath et al. 2021).

Here, we focus on math, which is a challenging content area for many students. Research has led to a "consensus that enhancing language is crucial for promoting students' mathematics learning" (Erath et al. 2021, p. 245). However, math teachers often possess a limited understanding of the language demands embedded in their content and tend to view it as "universal" and easy for EBs to learn (Tan 2011; Lei et al. 2020). This is reflected in the classified ELs' math scores in the National Assessment of Educational Progress in Mathematics, which are lower than non-ELs' (National Center for Educational Statistics 2019), and in students' eventual career choices: fewer EBs will enter STEM jobs (Mervis 2010; Zigmont and Wolfe 2021; Vidot 2011).

To solve the dual challenge of integrating content and language in instruction, several pedagogical approaches have been developed, including Content-Based Instruction, Content and Language Integrated Learning, Specially Designed Academic Instruction in English, and Sheltered English Immersion (Cenoz 2015; Freeman and Freeman 1988; Sobul 1995). Here,

we focus on Sheltered English Immersion[1], or SEI, which aims to equip all teachers to address EBs' language development needs while providing access to content learning. However, novice teachers' implementation of SEI skills and knowledge acquired in university coursework remains unclear (Dubetz 2012; Johnson et al. 2018; Turkan and de Jong 2018), especially in mathematics, where the role of language tends to be overlooked (Lucero 2012). In addition, SEI has been criticized for lacking cultural and linguistic responsiveness (Chang-Bacon 2020, 2022).

To respond to this gap in research, we conducted a single-case study, which explores how one novice high school mathematics teacher trained in SEI-sheltered math for a classroom of EBs. Our study was guided by the question, How does a novice high school math teacher shelter her instruction for Emergent Bilingual students?

2 | Theoretical Framework

This study is situated within the framework of Content-Based Instruction (CBI), particularly drawing on Met's (1999) comprehensive analysis of language and content integration. CBI, a pedagogical approach that intertwines language and subject matter learning, manifests in diverse models across educational levels. Met (1999) illuminates the spectrum of language-to-content priorities, ranging from content-driven programs (e.g., immersion and partial immersion programs) to language-driven approaches (e.g., language classes with multiple uses of content for teaching the language). Sheltered courses, as described by Brinton et al. (1989), form a prominent subset of CBI. These courses prioritize content mastery, employing instructional strategies to "shelter" learners from the linguistic demands of the content and enhance their access to the curriculum.

In the U.S., the acronym SEI is variously applied to models called Sheltered English Instruction or Sheltered English Immersion (e.g., U.S. DOE, n.d.; Wyoming Department of Education, n.d.), Sheltered English Immersion (Massachusetts Department of Elementary and Secondary Education, n.d.), and Structured English Immersion (Arizona Department of Education, n.d.). Approaches to SEI vary in implementation and in teacher certification requirements. However, in general, it includes the following three features, implemented most often by content area teachers trained in SEI strategies: focusing on content and language objectives; making content comprehensible by connecting to students' background knowledge, teaching vocabulary explicitly, presenting cognitively demanding content in context-embedded ways, and using cooperative learning; and using alternative assessments (Markos and Himmel 2016, p. 3).

Content and language-integrated approaches are also increasingly being intertwined with frameworks that emphasize cultural and linguistic responsiveness (e.g., Lucas and Villegas 2013; Villegas and Lucas 2002). These frameworks emphasize the significance of acknowledging, incorporating, and sustaining students' linguistic and cultural skills, knowledge, and frames of reference from their homes and communities. The Massachusetts SEI model was not built on a strong foundation of cultural and linguistic responsiveness, but from our work in the teacher education community of the state, we know that SEI instructors are striving to incorporate this approach into their SEI courses. Therefore, we also approach our analysis by looking through this lens.

3 | Related Literature

3.1 | The Language of Math

The language of math differs significantly from everyday language, notably in specialized vocabularies like *composite numbers*, and words like *even* and *series* that have specific meanings in mathematical discourse (Adoniou and Qing 2014; Chval et al. 2015; Slavit and Ernst-Slavit 2007). In addition, many sentence patterns and grammatical structures have more complex and specific meanings in math; Gough (2007, p. 8) gives the example of "functions that decrease at an increasing rate, or decrease at a decreasing rate." Further, the language of math makes frequent use of comparative structures, prepositions, and conjunctions, which may be especially difficult for EBs (Schleppegrell 2007; Slavit and Ernst-Slavit 2007). Moschkovich and Scott (2021) posit the language of mathematics includes "styles of meaning, modes of argument, and mathematical practices," which are present at different levels, from words and phrases to background knowledge (Moschkovich and Scott 2021, p. 332). Finally, different languages use different mathematical notation to convey the same concept (Adams 2003).

Empirically, research has shown the importance of language knowledge for students' performance in math. For example, research with 9th-grade classified ELs conducted by Beal et al. (2010) showed that stronger reading proficiency predicted higher math achievement and that students needed to gain a certain level of proficiency in reading before positive effects could be seen in their math performance. In a similar vein, Alt et al. (2014) compared the math performance of EBs and monolingual English speakers in tasks with different linguistic and mathematical complexity and found that EBs underperformed the monolingual group only on language-heavy tasks. Other research has shown similar results, indicating that language, not mathematics ability, is holding EBs back (Abedi and Lord 2001; Beal and Barbu 2010; Martiniello 2008; Shaftel et al. 2006). These studies indicate that English language proficiency and literacy play a significant part in EBs' math achievement in U.S. schools. Students therefore need "support in using the precise language of math and understanding how words...[map] onto symbolic and pictorial representations of mathematical concepts" (Ippolito et al. 2017, p. 69).

3.2 | Teaching the Language of Math

Currently, content-area teachers are not adequately prepared to meet the needs of EBs (Cross 2016; Lucas et al. 2018; Villegas et al. 2018). This is due to several factors, including a lack of a concerted focus on teaching EBs in pre-service teacher preparation programs (Ballantyne et al. 2008; Darling-Hammond 2006; Villegas and Lucas 2002), a lack of professional development on

the needs of EBs in different content areas (Combs et al. 2005; Lucero 2012), and the fact that most teacher candidates continue to come from monolingual English-speaking backgrounds (Gay 2018; King and Butler 2015; Nieto 2015).

To be effective with EBs, teachers need to effectively integrate language development into their content instruction (Cenoz 2015; Chval et al. 2015). They also need to develop culturally and linguistically responsive orientations and practices, including sociolinguistic consciousness (knowledge of the connections between language, identity, and culture), a tendency to value linguistic diversity, an inclination to advocate for EBs, strategies to learn about EBs' language and academic backgrounds, an understanding of how a second language is learned, the ability to identify the language demands of classroom tasks, and a set of scaffolding strategies to support the learning of EBs (Lucas and Villegas 2013, p. 101). However, research shows that math teachers, in particular, often fail to incorporate these aspects into their pedagogy for EBs (Nasir et al. 2008).

Research has found that when teachers do consider the language demands of math, they tend to focus on vocabulary as the main component, ignoring larger language structures (Turkan and de Jong 2018). Even when math teachers address vocabulary demands, they often do not allocate enough time to teaching it explicitly (Monroe and Orme 2002). In some cases, teachers may avoid using mathematical terminology altogether in a misguided attempt to lower the language demands of math (Turkan and de Jong 2018). To address more than vocabulary, Erath et al. (2021) proposed principles that included specific attention to discourse practices, the integration of language and math concepts, and students' multilingual and multimodal practices. Hence, research has stressed the need for carefully constructed discussions around mathematical concepts (Turner 2011), which would address the need for EBs to practice mathematical language. However, research has also emphasized that much depends on the quality of the discourse (Adoniou and Qing 2014; Mortimer and Scott 2003; Stein et al. 2008).

3.3 | Sheltered Instruction

An approach to Content-Based Instruction called Sheltered Instruction is common in the education of EBs in the United States. It was developed to help EBs learn both content and language (Fritzen 2011) and is meant to gradually transition them to mainstream classes as they develop more English proficiency (Markos and Himmel 2016). It is a pedagogy that: "makes grade-level academic content accessible...while at the same time promoting target language development; and... highlights key language features and incorporates strategies that make content comprehensible" (Dubetz 2012, p. 43). In the U.S., the acronym SEI is variously applied to models called Sheltered English Instruction (e.g., U.S. DOE, n.d.; Wyoming Department of Education, n.d.), Sheltered English Immersion (Massachusetts Department of Elementary and Secondary Education, n.d.), and Structured English Immersion (Arizona Department of Education, n.d.). These models look different across states, and we recognize comparisons are difficult to make. Here, we use the Massachusetts term Sheltered English Immersion and use it to refer to content and language integrated sheltering strategies used mostly by mainstream teachers for EBs in their classrooms.

In Massachusetts, Sheltered English Immersion is the predominant mode of instruction for classified ELs (Massachusetts Department of Elementary and Secondary Education 2022), and all Massachusetts core content-area teachers, including math teachers, are required to complete one course in SEI. Yet, there is limited evidence that SEI effectively addresses the challenge of integrating content and language in a manner conducive to student success. Research has criticized SEI for promoting a one-size-fits-all approach to teaching (Swasey 2021) and fostering a monolingual ideology (Chang-Bacon 2020, 2022). In fact, in 2017, Massachusetts passed a law to allow the creation of bilingual education models after it had become apparent that SEI alone was not the golden key to EBs' academic success (LOOK Act 2017).

Furthermore, the lack of research on SEI's effectiveness in math classrooms highlights additional concerns. Even in states mandating SEI, teachers often struggle to describe, let alone implement, this instructional model effectively (Wright and Sung 2012). When implementing SEI strategies, teachers often gravitate towards easier methods, such as increasing the use of visuals, rather than engaging in more labor-intensive approaches like modifying the curriculum or providing home language support. These latter strategies, though more demanding, truly differentiate SEI from 'just good teaching' (Johnson et al. 2018). Further, Lee et al. (2013) posit that although SEI tries to merge language and content, its focus is often solely on language elements instead of "language for sense-making" (p. 231).

In addition, SEI has not been successful in changing teachers' perceptions of EBs as outsiders: as Chang-Bacon (2022) puts it, "mainstream education still presumes a monolingual, English-speaking student as the 'norm' around whom curriculum is designed" (p. 509). Dobbs et al. (2022) investigated pre-service teachers' perceptions of EB students after an SEI course. They concluded that an SEI course did not make pre-service teachers fully aware of EB students' needs and difficulties. In addition, many pre-service teachers held their monolingual, English-only ideologies even after passing the SEI course.

4 | Methods

This study employs a case study research design, a method characterized by its commitment to deriving an in-depth understanding of a singular or small number of cases within their real-world context (Bromley 1986). As Yin (2009) outlined, a crucial aspect of case methodology is the inclusion of contextual conditions surrounding the case. We chose the case study method for this study to be able to account for these contextual conditions, which included SEI as the state's prevalent instructional model, the novice teacher's limited preparation to deliver such instruction, and the wider context of math as a content area where language demands and EBs' instructional needs are easily overlooked. In addition, the case study method served the aims of this study by offering an in-depth look at one teacher's practice. Using a case study methodology, this research aims to unravel the complexities of sheltered mathematics instruction for EBs in the context of a novice teacher's experiences.

4.1 | Participant and Setting

This study centers on the instructional practices of a novice math teacher, referred to as Eve. She graduated the previous spring from a 5-year Bachelor's program, majoring in math with a minor in education, securing a teaching license in secondary mathematics. In the final year of her teacher education program, Eve completed a semester-long, 3-credit SEI course, covering state-prescribed topics on EBs, second language acquisition, sheltering strategies, and EBs' English literacy skills development. The course included a 20-h field experience in an after-school program at a middle school with a diverse language background. Notably, the first author regularly taught the SEI course in the program, though Eve was not her student.

In her senior year, Eve served as a calculus peer tutor and completed her practicum in a high school with 35% classified ELs. At the time of data collection, Eve was a first-year math teacher at a vocational-technical high school with over 1500 students. Among them, 12.8% were classified ELs, 17.9% participated in Individualized Education Programs, and the majority (83.3%) were Hispanic. In the 2019 state math proficiency exam, only 6% of the school's 10th-grade ELs met or exceeded expectations.

We observed a freshman integrated math class taught by Eve, where many students had special needs addressed with Individualized Education Programs (IEPs). Eve had a full-time co-teacher licensed in special education. All but one of Eve's students were bilingual Spanish speakers, with an overall English proficiency level of 3 or 4 (out of 6), as measured by the WIDA[2] Access test. Eve, an Asian American female, identified as a monolingual English speaker with past exposure to Hebrew. She provided informed consent to participate in the study.

4.2 | Data Collection and Analysis

Data collection took place from late fall semester 2019 to early spring semester 2020, and was interrupted by the COVID-19 pandemic. The first author visited Eve's classroom seven times, approximately every 2 weeks, to observe one 42-min long period of her freshman integrated math. During the observations, the first author took detailed field notes, capturing much of Eve's instruction verbatim, and photographed instructional materials. After each observation, Eve debriefed the lesson with the first author during a 20-min unstructured interview, which was recorded and transcribed. An additional data source was two focus group interviews in which Eve took part in February and May 2020. The focus groups examined novice teachers' preparedness to teach EBs. Each lasted an hour and was recorded and transcribed for analysis.

The data sources were analyzed by the authors using initial codes drawn from the literature on Content-Based Instruction, particularly SEI and English Language Development, including non-linguistic strategies such as graphic organizers, guided notes, and visuals; discourse strategies such as a slower rate of speech, paraphrasing, and repeating; scaffolding strategies such as chunking information and modeling; and culturally and linguistically responsive instruction such as translanguaging. Each author coded the documents independently, then conducted several joint coding meetings in which any discrepancies were discussed and solved, and codes were added, refined, or deleted depending on their prevalence in the data. The final coding scheme consisted of codes organized into three main categories, namely modified instructional materials, other scaffolding strategies, and culturally and linguistically responsive teaching (See Table 1). Other codes and categories that were not as prevalent in the data set have been omitted from this article for the sake of clarity.

5 | Findings

Below, we detail the ways Eve sheltered her mathematics instruction with modified instructional materials, other scaffolding strategies, and culturally and linguistically responsive instruction and how she described them during the debrief interviews.

5.1 | Use of Multiple Modified Instructional Materials

To enhance students' access to the grade-level curriculum, SEI teachers often modify instructional materials. Eve employed a key sheltering technique by supplementing verbal or numeric information with visuals and graphics. Her lesson slides, classroom displays, and handouts consistently featured graphs and illustrations to aid student understanding. In one lesson, two 8x11-inch sheets on the whiteboard displayed definitions and graphic representations of “perpendicular lines” and “parallel lines.” Eve noted that she would sometimes have students draw their own visuals as well, stating: “Yesterday they had to draw a visual of what a solution to a system looks like, and I said ‘it doesn't have to be perfect, but let's get a visual down so we have an idea of what it should look like.’” This attention to providing visuals was a strategy Eve's SEI course had heavily emphasized.

We observed Eve's instructional materials emphasizing linguistic representations of mathematical concepts, including written expressions like “x is greater than or equal to six” and verbal scenarios like “Mason always has at least six pencils in his locker.” Eve effectively used a combination of numeric, visual/graphic, and linguistic representations for each mathematical concept.

TABLE 1 | Coding scheme.

Category	Codes
Modified instructional materials	Graphic organizers, guided notes, and visuals
	Multiple representations
	Text features
Other scaffolding strategies	Defining key vocabulary
	Chunking material
Culturally and linguistically responsive teaching	Building relationships
	Connecting to students' backgrounds

She implemented activities where students engaged with all three simultaneously, such as a matching game with cards for corresponding graphs, verbal sentences, and number sentences. This strategy, not emphasized in the SEI course, was acquired from her math pedagogy classes in her education minor.

Another way Eve modified her instructional materials was by creating guided notes, printed handouts that included sentence starters, boxes, numbered lists, or pre-filled notes as organizational tools. She found these particularly helpful for students requiring vocabulary support or sentence frames to express their mathematical thoughts linguistically. Eve highlighted their role in maintaining student organization, contrasting them with blank paper. During a focus group, she expressed how guided notes offered opportunities to challenge students:

> I differentiate...the guided notes, because I know some of my students who are higher, they're not going to need me to write down the problem, because I know they'll do it right away without me asking...I think there's a huge benefit to any differentiated instruction you do for emergent bilingual learners.

Eve learned the guided notes strategy during her practicum from her mentor teacher, who used them as graded assignments daily. While she didn't agree with grading notes for every lesson, she acknowledged their benefits for EBs.

A third type of modification Eve used in her instructional materials was incorporating various text features such as color-coded items, bolded keywords, and symbols like arrows and circles to emphasize key information (see Figure 1). She found this strategy, learned from a colleague, to be an easy yet effective way of meeting her EBs' needs.

5.2 | Other Types of Scaffolding Strategies

Research indicates that teachers often prioritize vocabulary to scaffold emergent bilingual students' learning of the language of math. Eve's lessons also focused heavily on the use of this scaffolding strategy. In a lesson debrief, she emphasized the use of definitions as a key method for teaching vocabulary. She explained, "I take whatever concepts we're going to be talking about. I find key vocabulary words and when I do definitions with them, I will either color code, highlight, or underline [the words]. And then in the guided notes [the definition] is there word for word." This approach was evident during a class where students took guided notes on a new term, "compound inequality."

> Eve: Okay, first definition. [She reads aloud from a slide, twice] "Compound inequality is when you combine two or more inequalities."

> [Students take notes, writing the definition down. Underneath the definition there is a green box that reads: $4 \leq x$ and $x \leq 8$. The word 'and' is in red letters. Eve reads this aloud.]

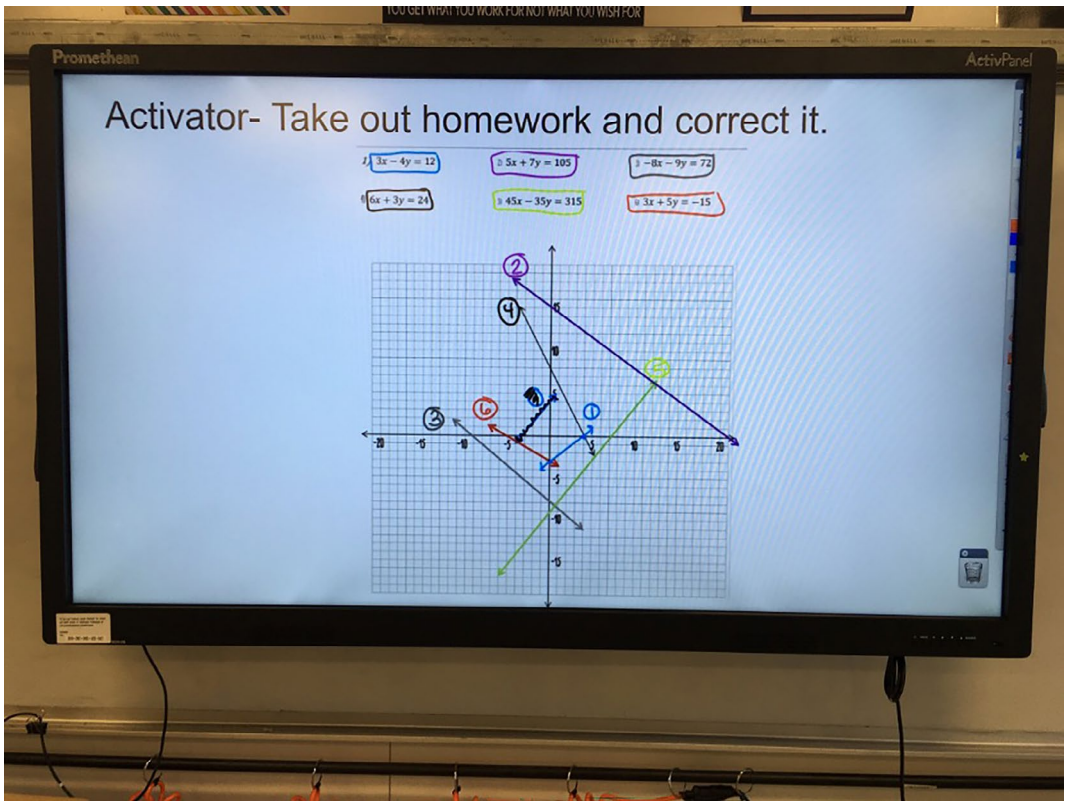

FIGURE 1 | Modified instructional materials: Color coding.

> Eve: Next to that example I want you to draw an arrow and write this: $4 \leq x \leq 8$ [she writes this]. This is just another way of saying the same thing. This is one more example of how you can write a compound inequality.

Later, during a debrief, Eve discussed why she focused so much on defining mathematical terms:

> I think that [definitions are] a great way to break it down for students. And not only emergent bilingual students, all students for math. Math is very hard when it comes to definitions. So it's definitely beneficial to everyone.

This scaffolding strategy was useful in two ways: it allowed Eve to focus on developing students' vocabulary, but also afforded a space where the math concepts contained within those vocabulary words were further explained and elaborated upon. It's important to highlight that Eve saw the use of definitions in vocabulary teaching as beneficial for all students, not just EBs. While the SEI course she attended included the use of definitions in effective vocabulary instruction for EBs, Eve applied this approach to address the general language demands of math, extending beyond SEI-specific strategies.

Another scaffold EB students benefit from is instruction being "chunked" into digestible parts since learning new content and language at the same time poses a double burden on their cognitive reserves. Eve recognized that chunking material was an important way for her to scaffold her students' learning. However, in practice, she did not always manage to chunk the instruction sufficiently, as was evident from her sometimes too fast-paced instruction. During one particular lesson, Eve was teaching students how to use graphic calculators in preparation for a lesson the next day. She was guiding students rapidly through several steps for using the calculators, as the excerpt below shows:

> Eve: We will graph our first linear system. Press the y = button, it's right over the blue button. Press the y = button. Now you should have a screen that has y1, y2, etcetera. Now I will reference this sheet, number one. [She holds up a worksheet.] I will type in my first equation, which is $x + 3$, so I have to find the x button. The x is right here.

> [She displays a visual of the calculator and points to it as she gives instructions.]

> Eve: I will go through all these instructions so don't go ahead. If we can't use this tech properly you will lose the privilege. Press x then press + and press 3.

> [She points at these buttons on the visual.]

> Eve: Now we have $x + 3$. Now you're gonna hit enter and it should bring you to y2. Pay attention [student name], we have to make sure we're interacting today. Now you're at the y2=. We have to write the second equation. The negative and minus button are two different ones. If I say negative, do we see a minus in parentheses? That's the negative button. Press negative, press 2, press x.

Eve scaffolded her lesson by showing visuals of what students should be seeing on the calculator screen at each step. However, the pace of the lesson seemed to be too fast with too much material. Students whom Eve reprimanded for talking during the lesson were, in fact, trying to ask each other for help, and while some students managed to graph the intersecting lines, others did not. A better way to chunk this material might have involved stopping after each step to check that every student was seeing the same on their calculator screens as what was displayed on the board, allowing students to verbalize each step in their own words both within their table groups and with the whole class, and stopping to clarify any vocabulary words that were challenging to students within each step. Eve herself realized that she had not chunked her lesson adequately:

> Today was a lot of just heavy calculator use and the students were getting frustrated because it was a lot. A lot of new things, a lot of new buttons, a lot of new words, a new screen, it was just a whole different thing... I think we need to chunk it better so it's less overwhelming.

While the SEI class had introduced Eve to the idea of scaffolding, she was clearly more comfortable with some techniques—such as including word definitions on her slides and in the guided notes—than others, such as deciding how much new information students could handle at a time. In addition, as the excerpt illustrates, her discourse practices were often teacher-dominated, which aligns with findings from previous research (Adoniou and Qing 2014; Mortimer and Scott 2003; Stein et al. 2008). It is clear that her SEI course had not been sufficient for developing these practices.

5.3 | Some Evidence of Culturally and Linguistically Responsive Teaching

Eve's culturally and linguistically responsive teaching was particularly evident in how she established and maintained relationships with students. Like many new teachers, she spent additional hours at school and offered tutoring after regular work hours. These interactions outside of class allowed Eve to informally get to know her students well.

> I know some of them have those jobs that they need to go like babysit their siblings because I talked to them ...But it is nice at this point that I have these relationships with these students that I can be like, "Hey, come after school" or I know you can't come after school on this day because I know you have

> these appointments every week but maybe let's do Thursday.

Learning about her students as whole human beings with lives outside of her classroom was a culturally responsive practice that has been found to humanize student-teacher relationships (Salazar 2010). When interviewed about the linguistic backgrounds of her students, Eve was very knowledgeable and expressed the need to tailor her instruction to students' English proficiency levels. She had also grouped the students according to her knowledge about them, both academically and as individuals.

Another way to provide culturally responsive instruction is to make sure students can see themselves in instructional materials. In the dataset, there were very few instances where Eve connected to students' backgrounds in these ways. However, we did discuss one example during a debrief interview:

> It was funny cause yesterday I did a couple of word problems like, in Massachusetts to get your driver's license you have to be at least 16 and [I presented] an inequality to represent that. They were all intrigued about that, and I also had this little image of a driver's license on the board, and they were like, "Miss, do you know him?" and I said no, that's a sample (laughing).

Using a driver's license as an example was obviously a relevant connection for these students, who were at or near the age of getting their first license. Other times, though, we observed examples in word problems and other materials that were not as relevant for students. In one instance, Eve had students calculate whether it was cheaper to have a monthly membership at a tennis club or rent the tennis court hourly. This example was probably not something most of the students could connect to.

Despite some instances of culturally and linguistically responsive instruction, our observations of Eve's teaching lacked strong evidence of certain elements, such as advocacy for EBs or valuing linguistic diversity (Lucas and Villegas 2013). For instance, Eve did not challenge the exclusive use of English as the medium of instruction by encouraging translanguaging in her classroom (Marshall et al. 2023). It is essential to note that limitations in our data collection might have impacted the identification of advocacy or valuing linguistic diversity, which may become more apparent with prolonged observations and dedicated interviews on these aspects of Eve's practice.

6 | Discussion

The goal of this study was to describe how a novice teacher, trained in SEI, sheltered her instruction for EB students. Findings revealed that Eve effectively employed certain SEI strategies, including modifying instructional materials, providing mathematical term definitions, and creating a culturally responsive classroom through personal connections. However, she fell short in scaffolding instruction by not chunking material, lacking rich discussions for mathematical language development, neglecting language aspects beyond vocabulary, and not recognizing linguistic resources through translanguaging. We saw several areas of future growth for Eve's practice with EBs, including attending to students' linguistic diversity through purposeful opportunities for translanguaging, creating opportunities for students to produce more language for mathematical sensemaking, and increasing attention to language forms and functions beyond vocabulary.

The findings of the study are consistent with other research indicating SEI's lack of impact on novice teachers' perceptions and practices, which has found that novice teachers tend to be drawn to strategies that match their idea of "good teaching" and that do not challenge the status of English as the monolingual ideal (Dobbs et al. 2022; Johnson et al. 2018). Some of this may have resulted from the shortcomings of the state-mandated SEI course, which did not include a strong focus on culturally and linguistically responsive instruction or strategies tailored specifically to Eve's content area. These are clear drawbacks of the content-neutral and "linguistically blind" (cf. color-blind) nature of SEI.

It also became evident that Eve's instructional practices came from several different sources, such as her mathematics coursework, her time at her student practicum site, and her current colleagues. This points to the distributed nature of teacher learning but also to the fact that the SEI course alone had not provided Eve with a sufficient variety of instructional tools. We recognize that several factors, left unexamined in this study, may have played a part in Eve's SEI preparation. Evaluating the nature and effectiveness of professional development opportunities available to Eve (cf. Ingvarson et al. 2005) could have shed further light on potential SEI training that might have occurred after her teacher education program. School leadership, as outlined by Kanya et al. (2021), is another factor playing a role in shaping teachers' practices. In the context of teaching EBs, the policies set by school leaders can impact the school's overall approach to SEI. Lastly, teacher collaboration is another factor influencing instructional approaches (Echevarria and Short 2010). Examining the extent to which Eve engaged in more systematic and sustained collaborative practices with colleagues might reveal how these affected her instructional practices for EBs.

Given the findings of this study, we have several recommendations for teacher preparation. Given that Eve focused mostly on vocabulary as the main language demand embedded in math and neglected larger language structures, and that prior research has also identified this as a gap in teacher practice (Erath et al. 2021; Turkan and de Jong 2018), we recommend that in the future, SEI training help teacher candidates focus more on language beyond vocabulary (cf. "key language uses" and "language expectations," WIDA 2020). Further, since Eve's practice showed few instances of her engaging in culturally and linguistically responsive instruction, which aligns with prior research on the lack of such approaches and orientations in teacher practice (Lucas and Villegas 2013), we recommend that SEI and other CBI approaches be intertwined with these or other critical language pedagogies, to ensure that students are treated as whole human beings with unique backgrounds and assets. This study was conducted in a math classroom, where we saw Eve's challenges with integrating content instruction with practices that would support EBs' English language

development. Thus, we recommend teacher preparation in SEI offer more tailored approaches to each content area, for example by giving more opportunities to analyze discipline-specific language (Schleppegrell 2007). While this study focused on an educational model typical for K-12 schools in the U.S., we extend these recommendations to other content and language-integrated pedagogies currently being implemented both in the U.S. and elsewhere in the world (see, for example, Sato et al. 2017, on the need for criticality in CBI; Troyan et al. 2017, on considerations for discipline-specific CBI). We recognize that SEI is implemented differently in other teacher education programs and that the lone course on SEI required in our state could realistically not cover all of this. Therefore, we also recommend that SEI strategies be woven into teacher education coursework and ongoing professional development (Baecher 2012; Short 2013) and that degree programs include courses beyond the basic SEI course, such as those focusing on students with limited or interrupted formal education or EBs who have Individualized Education Programs. We also advocate for sustained opportunities for novice teachers to critically reflect on and discuss their instruction for EBs with university partners or school colleagues (Peercy et al. 2024). After all, learning to implement SEI effectively is "not about learning one new technique...rather... a more substantial change in practice that involves a new way of thinking about the content" (Short 2013, p. 122). This insight is true for all content and language integrated approaches, and we urge teacher educators across U.S. and international contexts to consider how best to prepare teachers to implement these models.

Like any other study, this study has limitations. The first limitation is its focus on just one participant from one particular teacher education program, which may differ from other programs that offer SEI training. Another limitation is not being able to analyze video or audio from the class to analyze the teacher's practices in more detail and to see the students' reactions and responses to each instructional move. Unfortunately, consent was not granted to the researchers for audio or video recordings of the classes.

Future research should consider following novice teachers from their pre-service preparation into their first years of teaching to see how they implement what they learn from their SEI training and how their perceptions and practices change during and after the program. Future research should also involve more participants for a longer period of time to construct a more complete view of how SEI translates to classroom practice. Generally, as the population of EB students continues to increase in the U.S., more research focusing on the processes through which content teachers can develop sheltering strategies for EBs is needed. This research is especially lacking in the content area of math.

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Ethics Statement

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] Sheltered English Immersion is the label used by the state of Massachusetts for this instructional model.

[2] In this study, we refer to the World-Class Instructional Design and Assessment (WIDA) Consortium, a widely used framework in the United States for assessing and supporting classified English learners. WIDA offers a suite of assessments grounded in the WIDA English Language Development (ELD) Standards Framework. These assessments serve various purposes, including identification, placement, progress monitoring, and achievement tracking. However, their adoption among the 42 Consortium states in the U.S. may vary.

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