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# Collaborative Translations: Designing Bilingual Instructional Tools

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## ABSTRACT

Recognizing the role of collaboration and multilingual literacy as 21st-century skills, the authors used design research methods to present, analyze, and refine a strategic reading approach for bilingual students. The collaborative translation strategy involves students reading an academic text, translating key passages, and evaluating these translations. Student discussions that ensued provided a rich context to support a thoughtful connection to textual concepts. The authors also discuss the development and refinement of domain-specific instructional theory that informs collaborative translation. Findings suggest the strategy holds promise for increasing student engagement and providing a central instructional role for heritage languages.

## INTRODUCTION

Nearly 40% of the world's population receives an education that minimally uses, neglects, or avoids a student's heritage language (Walter, Davis, & Morren, 1999). Along with being an example of cultural and linguistic hegemony, this discontinuity presents a profound pedagogical problem. Bilingual and emerging bilingual students who are separated from this critical aspect of their cultural history continue to lag behind fluent English-speaking students in academic achievement. In the United States, students who are learning English as a second language scored an average 36 points lower in fourth grade and 44 points lower in eighth grade on the *National Assessment of Educational Progress* reading scale (National Center for Education Statistics [NCES], 2013). As students progress through the upper grades, they are confronted with more conceptually dense texts across the disciplines (Cummins, 2007; *Education Week*, 2009; ELL Working Group, 2009) and often do not have access to appropriate grade-level content. With the increase in the number of students whose heritage language is different from the language of instruction, it is critical to use innovative instructional approaches that leverage the strengths of bilingual students.

Perhaps because of widespread globalization and transnationalism, literacy in the 21st century is increasingly recognized as multicultural, multilingual, and multimodal. Along with reading and writing print, today's youth consume and compose moving, multilingual, and digitally mediated texts. These texts accomplish a wide variety of social and cultural goals as they reflect, refract, and question youth identities and local conditions. As our conceptions of texts and literacy (or literacies) change, methods of investigating

and developing literacy need to be reevaluated and reimagined. In identifying 21st-century skills, researchers have highlighted several important literacies (North Central Regional Educational Laboratory, 2003), including multicultural literacy. This report clarifies that multicultural literacy requires that students not only appreciate the subtleties of culture, but should also be able to listen, converse, and write in more than one language. The same report also identifies collaboration and interactive communication skills as paramount in the 21st century. Targeting both these goals, we explored collaborative translation as a promising strategy to support the literacies of bilingual youth.

The design research project discussed here developed over three years in partnerships between a university research group, four local schools, and 32 bilingual students. Recognizing the untapped potential of heritage languages, we designed, implemented, and tested an instructional strategy called TRANSLATE (Teaching Reading and New Strategic Language Approaches to English Learners) to create opportunities for students to use their heritage language in academic settings (Jiménez, et al., in review). In particular, we sought to help teachers and students value their heritage language and view this language as an asset rather than a deficit. This approach was developed at the nexus of research on translation, collaborative learning, and design research.

## LITERATURE REVIEW

### Translation

Theoretically, translation is a complex cognitive, linguistic, and social practice. In analyzing approaches to translation, Nida (2000/2012) distinguished between two forms: a gloss translation and a dynamic translation. A gloss translation focuses on literal "word for word" correctness. In contrast, a dynamic translation uses the language and cultural understanding most appropriate for the audience. As a practical matter, most translations fall somewhere between these two forms. With social and cultural purposes in mind Appiah (2000/2012) described translation as an attempt "to produce a text that matters to one community the way another text matters to another" (p. 425). Thus, translators might also be conceptualized as brokers who make connections across different communities of practice (McQuillan & Tse, 1995; Wenger, 1998).

Although translating is a complex and authentic literacy practice, research on how translation can support classroom learning is scarce. Citing empirical research from the 1970s, Williams and Snipper (1990) suggested that translation can facilitate transfer of heritage-language skills, allow students to make connections to

what they already know, and enhance retention of new information. While Orellana and Reynolds (2008) documented that children of immigrants regularly translated for their families, they also observed that schools seldom required these same students to engage in equally demanding literacy activities. In school settings, there is evidence that translation supports students' understandings of text (Kenner, Gregory, Ruby, & Al-Azami, 2008), helps students develop metalinguistic awareness (Martínez, Orellana, Pacheco, & Carbone, 2008), and mediates student participation and meaning making (Puzio, Keyes, Cole, & Jiménez, 2013). Although translation is a literacy practice that many bilingual students participate in outside of school, understanding how translation can be used strategically in K–12 school settings requires more research.

### Collaborative Learning

A wide variety of research supports the practice of students reading, discussing, and negotiating meaning in cooperative and collaborative groups (Puzio & Colby, 2013). For bilingual students in particular, syntheses of quantitative (August & Shanahan, 2006; Slavin & Cheung, 2003) and qualitative (Genesee, Lindholm-Leary, Saunders, & Christian, 2005; Gersten & Baker, 2000; Gersten & Jiménez, 1998; Lightbown, 2000) research provide positive evidence for this activity structure because collaborative dialogue promotes enhanced participation (Calderón, Hertz-Lazarowitz, Ivory, & Slavin, 1997; Klinger, Vaughn, & Schumm, 1988), negotiation (Gass, Mackey, & Ross-Feldman, 2005; Swain, Brook, & Tocall-Beller, 2002), and language acquisition (Cole, 2013). At the same time, cooperative learning has also been described as a double-edged sword (Dunston, 2002). Even though students, on average, prefer (Elbaum, Schumm, & Vaughn, 1997) and benefit from working and learning with others in small groups, this structure, at times, can be marginalizing and hierarchical (Cohen, 1994; Poole, 2008). In any setting, group participation patterns are not always equal (Goatley, Brock, & Raphael, 1995), and interaction is influenced by multiple factors, including friendship (Alvermann et al., 1996; Evans, 2002), gender composition (Evans, Alvermann, & Anders, 1997), and domineering students (Evans, 2002).

### Design Research

Design research, or design experiments, study learning by investigating how people learn concepts and strategies in designed environments (Cobb, Confrey, Disessa, Lehrer, & Schauble, 2003; Collins, Joseph, & Bielaczyc, 2004; Reinking & Bradley, 2008). This method might best be categorized as “interventionist-observational” (Kelly, Lesh, & Baek, 2008, p. xiii). Because design research systematically introduces and iteratively redesigns features of the learning environment (e.g., tools, texts, tasks, activity structures, and instructional sequences), it uses interventionist methods, including quantitative measures. Because it seeks to analyze and understand how people learn particular concepts and strategies, it uses observational and participant-observer methods. Equally important, it is also a highly responsive and creative endeavor, one that is capable of demonstrating what is possible for

students' learning beyond traditional and institutionalized standards and practices (Mehan, 2008).

### METHODS

This article is organized to present our research using a design cycle (Middleton, Gorard, Taylor, & Bannan-Ritland, 2008) that has seven phases: (a) grounded models, (b) development of artifact, (c) feasibility study, (d) prototyping and trials, (e) field study, (f) definitive test, and (g) dissemination and impact. With over 100 hours in educational settings, we have completed up to Phase 4 of the design research cycle, as described in Table 1. Because we have not completed the final phases, our intent is not to demonstrate that the envisioned instructional strategy “works.” Rather, our purpose is to report the outcome of our efforts to test and revise conjectures about collaborative translation and means of supporting students in appropriating this strategy. A secondary goal is to report knowledge that will be useful in guiding others who attempt to support students learning similar concepts or strategies (e.g., Brown, 1992; Cobb et al., 2003; Collins, 1992; Design-Based Research Collective, 2003; Edelson, 2002; Gravemeijer, 1994). Therefore, it was critical to frame our study as a paradigmatic case of a broader phenomenon. We view collaborative translation as a case of literacy strategy instruction—similar to summarizing, predicting, and visualizing. Because heritage language is a key component of students' cultural and linguistic histories, collaborative translation can also be viewed as culturally responsive pedagogy.

Table 1. Design Research Phases, Settings, and Participants

Design Research phase	Setting	Participants
Grounded Models	University	University researchers
Development of Artifact	University Elementary School	University researchers 4th grade bilingual students
Feasibility Study	Middle School 1 Middle School 2	7th grade bilingual students
Prototyping and Trials	Middle School 1 Middle School 2	7th grade bilingual students
Field Study	Future	
Dissemination and Impact	Future	

Our data collection included student interviews, student questionnaires, video-recorded instructional sessions, copies of student translations, and field notes. In feasibility studies and field trials, we worked with small groups of upper-elementary and middle school students in three different schools. Every instructional session was transcribed and translated. Our design and analyses were ongoing, and iterative processes occurred before, during, and after instruction. In general, we outlined the instructional tasks a day or two in advance, as informed by our current conjectures. The sequence and structure of our strategy embodied specific conjectures about current and future learning about translation. As part of the process of

testing and revising our ongoing conjectures, we found it essential to have short debriefing meetings after each classroom session and longer team meetings each week.

## DESIGN RESEARCH PHASES

### Grounded Models

The first phase in design research is to establish the problem or issue to be addressed (Middleton et al., 2008). This is often done through reviewing previous literature or, in some cases, analyzing secondary data sets. Over two years, the university research team read and discussed a variety of empirical and theoretical articles on bilingualism and the effective instruction of bilingual students, culturally responsive instruction (e.g., Lee, 2007; Orellana & Reynolds, 2008), cooperative learning, and translation (as noted above). Over the course of time, we identified the following researchable goal: to support bilingual and emerging bilingual students to learn grade-appropriate content and concepts.

Distressingly, bilingual and emerging bilingual students too often perform worse academically than students whose heritage language is the same as the school's language (e.g., NCES, 2013). We conjectured that this problem exists, in part, because when a student's heritage language differs from the school's language of instruction, educators and policymakers view this language as a problem rather than a resource (Ruiz, 1984), treat this linguistic background as an impediment to learning (Gitlin, Buendía, Crosland, & Doumbia, 2003; Reeves, 2006), and provide low-quality instruction (Callahan, 2005; Koyama, 2004; Padilla & González, 2001; Watt & Roessingh, 2001).

A critical feature of grounding models reported in the literature is to clearly articulate researchable and testable conjectures. These conjectures support the development and refinement of local instructional theory. Because students translate for social and cultural purposes (Malakoff & Hakuta, 1991; Orellana & Reynolds, 2008), our first conjecture was that participation and engagement would increase when students were encouraged to translate for academic purposes. Our second conjecture was that classroom translation would support students to value and appreciate their heritage language. While there is vast support for collaborative approaches to learning and bilingualism (e.g., Adesope, Lavin, Thompson, & Ungerleider, 2010), we had very little guidance from the literature about how to structure, sequence, or support students to collaboratively translate for *academic* purposes. From an instructional perspective, our third conjecture was that some groups would not be able to construct translations because students might not have basic composition literacies (e.g., "I can't write in Spanish"). From an outcomes perspective, our fourth and final conjecture was that collaborative translation would support better reading comprehension because second-language development is mediated through the first language (e.g., Cook, 1999; Lantolf & Thorne, 2006), and structured opportunities for discussion and negotiation (e.g., Johnson, 2004; Lantolf & Thorne, 2006) support the learning of bilingual students. The project that

is described here—Project TRANSLATE—developed, refined, and tested these conjectures.

### Development of Artifact

The second design research phase of our study was to structure, sequence, and detail our instructional prototype. Based principally on guided reading (e.g., Fountas & Pinnell, 1996), our prototype consisted of the instructor asking students to preview an English printed text, talk about what they already knew, read the text silently, and then construct written translations in Spanish. To field-test this prototype, we conducted a brief trial (three days, one hour each day) with two small groups of fourth-grade bilingual students. Because students were studying the American Revolution, we identified an age-appropriate history textbook that described the complaints of American colonists. In our instructional session, the intent was to chronicle instructional starting points by documenting translation strategies and instructional challenges associated with collaborative translation. Unlike local educators, research instructors were not primarily focused on supporting students' understanding of the content (e.g., taxation without representation); rather, they probed students' reasoning and thinking about translation. In this field test, we invited students to translate a short paragraph from their textbook.

From this experience, we recognized that our initial design needed several refinements. In pairs, students were highly engaged in translating and began with very little instruction. While verbal translations came quickly, it took a long time for students to construct written translations.

We also recognized quickly that translating a paragraph would be a time-consuming task. In future iterations we preselected key quotes and excerpts (e.g., 10–15 words rather than paragraphs) that contained critical ideas. Lastly, although we conjectured that writing in the heritage language would be an obstacle, this was not (nor was it ever) the case. While there are always subtle negotiations about who writes for the group, we have yet to find a small group of students who cannot construct a written translation (in Spanish, Kurdish, and Somali). Although students were strongly engaged in the activity, it was difficult to assess if students' understandings of the concepts were supported by the translation activity.

### Study Feasibility

The third phase was to establish the feasibility of our study, both with the Institutional Review Board (IRB) and local educators. Middle schools that had a substantial population of bilingual students were contacted. Along with gaining IRB approval, it was necessary to "sell" the idea to teachers and administrators. The school administrators were receptive, but did not want us to remove students from class before the end-of-year tests were given. From individual educators, we received a variety of different reactions, including enthusiasm and hesitation. While many teachers and administrators felt positively about the importance of the student's heritage language, some worried about the legality and propriety of using languages other than English in school settings (Cole et al.,

2012). As such, we had to modify the schedule so that it would fit into the last few weeks of the school year. The school agreed to let us work with 10 bilingual, Spanish-speaking students every afternoon for two weeks. At our request, administrators and teachers identified the student participants as Spanish-speaking, bilingual students who read below grade level.

Although we had hoped to work with students over a longer period of time (and not immediately before summer break), we accepted the invitation as it was given and began planning our revised collaborative translation strategy. After a successful two-week trial at the middle school (discussed below), we received positive feedback from students, educators, and administrators. Although we had planned to return to work with the same students the following year, the school administrators changed over the summer, and the new administrators decided that research was a distraction from their focus on raising test scores. As a result, we were required to find another site for our second trial.

We contacted another middle school and were given permission to work with students twice a week during the half hour set aside for math remediation. In this setting, one of our students was subsequently identified for special education services, and another student had severe behavioral problems, yet both continued as participants. In discussing the technicalities of using class time for this research at a teacher–researcher collaboration meeting, some teachers wondered if it was wise to take the participating students out of their math remediation. Ultimately, the teachers agreed to let us work with these students because they were “so far behind” that remediation would not help them pass the end-of-year standardized assessments. Our work at this second middle school took place twice a week for seven months. While administrators in both settings were genuinely concerned about supporting these bilingual students who were “behind,” pressures around institutional testing governed their decision making and our access to educational research settings.

### Prototyping and Trials

The fourth step was to trial the collaborative translation strategy in a more complex and naturalistic setting. In the first setting, we enacted our strategy with students for one hour per day over two weeks; the meetings took place in the library. While implementing a revised version of our collaborative translation strategy, our explicit research goal was to test and refine conjectures about translation. Upon reviewing the video from our initial field tests, we recognized that we needed to be highly strategic about selecting translatable texts that would support students’ understanding of specific concepts, so we identified textual themes (e.g., flawed heroes, cycle of violence) and chose excerpts that supported those themes. In the interaction reported below, students had been invited to translate a text that supported the cycle of violence theme: “Whoever shot him tore a hole through my heart too, a black hole that, instead of blood, gushed only a desire for revenge” (Langan & Alirez, 2004, pp. 11–12). In this interaction, Enrique says that he cannot write in Spanish, but that he can translate orally.

Teacher: *So . . . you’re going to translate this last sentence right here into Spanish because this is a really important sentence in the chapter, and we’ll have you try to put it into Spanish. Does that make sense, Okay? . . .*

Eduardo: (Shrugs) *I don’t know.*

Teacher: *Okay, other people?*

Enrique: *I can try translate it.*

Teacher: *Please, yes.*

Enrique: *But I can’t write.*

Teacher: *That’s fine, but tell us what you’d say, and he can be your writer.*

Eduardo: *We’re supposed to be saying it?*

Beatriz: *We have to write this.*

Teacher: *If he says it, then we can talk about it and then you can maybe write it down for him. And, remember, it’s not important that the writing is perfect. We’re just trying to find a way to put this down on paper. So can you start with a translation Enrique?*

Enrique: *Quien sea, quien le disparó este . . . Corazon, al negro, a uno negro, solo de la sangre, solo dejó venganza. (Whoever, whoever shot that . . . heart, to black, to a black one, only from the blood, only left revenge)*

Teacher: *Good, other thoughts about that? (Benito grabs the paper to read the sentence.) Do people like that translation, do we want to make a little change to it, or what do we think?*

Benito: (mutters a translation while looking at the English sentence on the paper) *dejó un hoyo, dejó un hoyo . . . (left a hole, left a hole)*

Eduardo: *un hoyo negro (a black hole)*

Benito: *en vez de sangre, dejó un venganza (in place of blood, left a vengeance)*

Benito: (takes pen and starts writing)

Eduardo: *por fin (finally)*

Teacher: *Thanks Benito*

In this interaction, Enrique—a savvy translator and a socially confident student—openly acknowledged his Spanish boundaries. He reported that he could translate the quote orally, but he could not write in Spanish. This verbalized limitation opened up possibilities for others. After Enrique’s initial oral translation, students collaborated verbally by offering multiple refinements and clarifications. Disconfirming our conjecture about writing, small groups were always able to construct written translations with very little instruction. Confirming our conjectures about participation, during translation, students typically leaned forward, spoke more frequently and quickly, and argued about the “right” or “best” translation.

In this setting, we made three improvements to the design of our collaborative translation strategy. Our first refinement to support participation was to separate students by gender. Quite early, we observed a substantial difference in the participation of boys and girls in mixed-gender groups. When prompted, the girls made contributions to group discussions, but in full group discussions they were reticent and quiet. We conjectured that these girls would participate more fully if groups were separated by gender. Indeed,

in gender-isolated groups, girls and boys both participated openly, moving from “really reticent” to “comfortable . . . talkative. . . and excited” about engaging with texts (Field notes, May 2010). Because our research goal was to support participation and understand collaboration translation, we maintained this separation for the duration of our work with middle school students.

Our second refinement was to select excerpts that included rich language. After reviewing the video recordings of several sessions, we noticed that the quality and the quantity of dialogue varied substantially with different texts. While we previously used texts connected to narrative themes (e.g., cycle of violence, heroism), we realized that metaphorical language yielded richer discussion and debate. For example, the following excerpt stirred tremendous debate: “They clocked me solid a few times, and I started growling like this angry dog Huero found one day” (Langan & Alirez, 2004, p. 14). Students wondered and argued about the right translation for “clocked me solid,” struggling with writing a translation that included words such as *clocked* and *times*, with their multiple meanings. Providing students with metaphorical language to translate consistently altered the students’ participatory stance from a passive reader to an engaged participant in discussions about the most semantically and pragmatically appropriate ways to translate to the heritage language. While student debates were thoughtful and sometimes heated, students usually required prompting from the instructor to bring the conversation from the semantic and word-level meanings to the larger narrative concept.

To support students to reason with text more strategically, our third refinement was to engage students in self- and peer-assessment. In our evaluation meetings and field notes, we noted that some of the best student translators evaluated to determine if a translation “made sense” because students often constructed word-for-word translations that were nonsensical at the sentence level. For example, when translating the title of the novel *Brothers in Arms* (Langan & Alirez, 2004), the students offered the translation “*Hermanos en Brazos*,” literally translating arms in reference to the body. Upon being prompted to ask if that title made sense to them, particularly after reading the book jacket, the students offered alternative translations for “arms,” ending with a closer approximation of the actual title. When students found themselves with a nonsensical translation, they would reread the translation, giggle, and figure out what made the sentence sound wrong. When this happened, it promoted discussions between students about the metalanguage and semantic appropriateness of the words and grammar used in the translations. As a result, we formalized this practice by adding an assessment procedure to the model that asked students to evaluate the translation in regards to meaning making. As instructors began to socialize this question (“Does it make sense?”), students also began asking each other this question and would often state, “*It doesn’t make sense.*” Students took the peer assessment further by questioning the translations of others in regard to writing with voice and word choice that corresponded to their understandings of characters in their text.

In the second middle school, we made two additional refinements to our designed literacy strategy. The first change built on the “Does it make sense?” refinement described above. In research meetings, we recognized that some—but not all—students were internalizing the sense-making approach to evaluating translations. If students were to become more strategic readers, we conjectured that they would need to appropriate this way of textual reasoning. Thus, we designed peer evaluation as a core feature in collaborative translation. After students constructed written translations, the instructor always facilitated an evaluative discussion. In this step, students discussed challenging vocabulary (e.g., Which words were hard to translate?), differences between translations (e.g., How are these translations different? Is one better?), and whether or not the translation “*made sense.*” This step elicited linguistically and conceptually complex (and spirited) debates. The following conversation occurred after the boys’ and girls’ groups created separate translations and wrote their translations on the whiteboard. This conversation demonstrates an example of our strategy for supporting students in peer evaluation after constructing translations:

- Teacher: *Can you tell me about yours? Why is your sentence good? . . .*
- Santos: *Um, I don’t know. We used some big words.*
- Teacher: *You used some big words? Any other things? Does this sound like something that Martin would say to himself?*
- Benito: *Ahh, maybe?*
- Santos: *No.*
- Teacher: *No?*
- Jacinta: *No*
- Teacher: *No? Why not? Jacinta?*
- Jacinta: *Um, he’s like a gangbanger and they don’t . . .*
- Sofia: *Gangbangers don’t use those kinds of words.*
- Teacher: *Gangbangers don’t use those kinds of words? Boys? What do you think about that? They’re saying that gangbangers don’t talk like that.*
- Enrique: *How?*
- Sofia: *Like that (points to their translation on the board)*
- Teacher: *Ok, Let’s look at the girls’, here. (reads girls’ translation)*
- Enrique: *Wow. (sarcastically)*
- Santos: *Yeah, that sounds so gangster. (sarcastically)*
- Teacher: *Ok. What do you have to say about the girls’ translation?*
- Santos: *Sentimental. (boys laughing, muttering in Spanish)*
- Teacher: *Sentimental? Is there something wrong with sentimental?*
- Isabel: *Ok, then be quiet because I wrote the same thing.*
- Santos: *Yeah, that’s what gangsters use. Ok! No sentimental. (sarcastically)*
- Sofia: *Ustedes tambien lo pusieron!, pusieron deprimido (You also put it! You put depressed.)*
- Teacher: *Ok, hey guys listen. If deprimido and sentimental are both words that don’t seem like gangsters, what word should you use?*
- Benito: *Mal. (Bad)*
- Santos: *Mal, no.*
- Teacher: *Wait, what word were you saying?*

- Santos: *Normally, like, people usually use that word not sentimental, because how 'bout if somebody walks up to you be like, oh, I feel so sentimental (said in an affected, feminine manner). I'd be like, whoa! Walk away. But if it's, this is depressing, I'd be like, "ok whatever" sentimental, I'd be like "ok bye."*
- Teacher: *Benito actually had mal here, but it didn't make it to the board but we had a discussion here about which word was more appropriate here. . . . So, putting mal instead of deprimido . . . So, why did you change it to mal and deprimido?*
- Isabel: *I had mal right here.*
- Teacher: *You've got mal in yours. So, why did you change it to sentimental and deprimido?*
- Isabel: *Cuz you said it had to be her, her words.*
- Teacher: *OK, Well, yeah. I did that. I really just wanted you to find the best words. Ok, other reasons. So why did you have mal here and not up here.*
- Santos: *Cuz we all voted on the other one. Not on that one.*
- Teacher: *Does mal work better? So, anything else we should say about these?*

When Sofia said that gangbangers do not use those kinds of words, she questioned the boys' translation ("*deprimido*"). The boys responded by saying that gangbangers would never use the word chosen by the girls' group ("*sentimental*"). In addition to showing that students had appropriated an important translation criterion (e.g., *Would this character use these words?*), this debate is notable because the novel's protagonist is, in fact, a sentimental gang member, and the students attempted to find appropriate words to capture this nuanced detail. From a pedagogical perspective, peer evaluation added value because, along with engaging students in argument, it regularly produced translations that made more sense and better reflected the narrative's language, characters, and themes. When students think deeply about the language that individual characters would utter, it demonstrates a keen understanding of this textual universe and the kind of reasoning that supports better comprehension.

Along with formalizing our approach to peer evaluation, we explicitly supported students to understand that there were different approaches to translating. Following the distinctions described by Nida (2000/2012), we observed that most students constructed gloss, word-for-word translations. We conjectured that dynamic translations, which focus on meaning and require more cultural inference, would engage students in a different kind of bilingual, textual reasoning: a reasoning more akin to what occurs during reading comprehension. We devoted three instructional days to explaining, modeling, and scaffolding students to understand and construct dynamic translations. Although a few students improved in constructing meaning-centered translations, the majority of students continued to construct gloss translations. Along with other possibilities, we tentatively concluded that students with strong L1 proficiencies were more capable of constructing dynamic translations.

## DISCUSSION

This documentation of our conjectures, iterations, and design process highlights some important conclusions about conducting literacy research with and for bilingual students. While providing spaces where students may learn valuable 21st-century skills, we continue to view collaborative translation as a strategic activity that supports engagement, values heritage language, and increases comprehension of academic concepts. The responsive and reflexive advantages of a design research approach are apparent. As opposed to traditional research cycles, where the intervention is tested without alteration, design research provides spaces for researchers to learn from and interact with the complex and changing literacy environment in which students operate. In this way, design research is a highly collaborative way of conducting research, where designers are continually trying to identify the best fit between instructional programs and students' reasoning and learning.

Along with supporting the development of a strategic way to support bilingual reading of disciplinary texts, this research has led to the development of domain-specific instructional theory (Cobb & Gravemeijer, 2008). When bilingual and emerging bilingual students collaboratively translated for academic purposes, they consistently showed strong and sustained engagement. Although there could be a pairing of students and groups that may not be able to construct written translations, most students in our study (even fourth graders) were capable of moving between languages and constructing written artifacts in their heritage language. Additionally, we observed that choosing shorter excerpts (10–15 words) from a text with rich, figurative language yielded the most thoughtful debate and discussion. Pedagogically, student debates about language co-constructed a rich context for supporting teacher-led discussions of text-level themes and ideas. In cognitive terms, this strategy might be a fruitful way to activate and socialize the background knowledge of students. Domain-specific instructional theory is useful because it enables other researchers to build on the knowledge of others and customize learning activities with students in other settings.

## IMPLICATIONS

The findings from this research have several implications for preparing 21st-century students. In our multicultural and multilingual world, students need to recognize and value different languages and perspectives. As educators learn to incorporate and leverage the language of students, curricula will become increasingly relevant and accessible. In literacy education in particular, collaborative translation is a promising approach that supports engagement, socializes students' knowledge, affords students real reasons to debate, and provides a rich discourse space that can be leveraged by the teacher to support a discussion of text-level themes and issues. These discussions provide opportunities for bilingual students to coconstruct meaning in ways that prepare them for a new era of learning. For English-only students, hearing

multiple languages in the classroom may help them value and appreciate linguistic and cultural multiplicity.

This research also has implications for future investigation. While this study was not designed to determine statistically reliable gains in reading comprehension, future studies might investigate this question. In addition, we hope this study shows that design research is a fruitful and responsive way to approach understanding and interpreting students' literacies. By becoming active participants in the literacy environment with students, we were able to implement and refine our designed literacy strategy and directly observe the results of our continuous and iterative refinements. As scholars learn more about the everyday practices of bilingual students, strategic approaches to bilingual learning need to be reimagined. This activity, marked both by extensive social interaction around texts and cultural tool use, yields promise for supporting bilingualism, biliteracy, and conceptual understanding within the disciplines.

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