Teacher Education that Works:
Preparing Secondary-Level Math and Science Teachers for Success with English Language Learners Through Content-Based Instruction

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Abstract

Little research exists on effective ways to prepare secondary mathematics and science teachers to work with English language learners (ELLs) in mainstream mathematics and science (subsequently referred to as STEM) classrooms. Given the achievement gap that exists between ELLs and their native-speaking counterparts in STEM subjects, as well as the growing numbers of ELLs in US schools, this becomes a critical issue, as academic success for these students depends on the effectiveness of instruction they receive not only in English as a second language classes (ESL), but in mainstream classrooms as well. This article reports on the effects of a program restructuring that implemented coursework specifically designed to prepare pre-service and in-service mathematics, science, and ESL teachers to work with ELLs in their content and ESL classrooms through collaboration between mainstream STEM and ESL teachers, as well as effective content and language integration.   We present findings on teachers' attitudes and current practices related to the inclusion of ELLs in the secondary-level content classroom and their current level of knowledge and skills in collaborative practice.   We further describe the rationale behind the development of the course, provide a description of the course and its requirements as they changed throughout its implementation during two semesters, and present findings from the participants enrolled. Additionally, we discuss the lessons learned; researchers' innovative approaches to implementation of content-based instruction (CBI) and teacher collaboration, which we term two-way CBI (DelliCarpini & Alonso, 2013); and implications for teacher education programs.

Keywords

Collaboration, teacher education, TESOL, STEM teacher education, English language learners, ELLs, ESL teachers

Introduction

Schools in the United States are becoming more linguistically diverse, and as a result, greater numbers of mainstream teachers than ever before find themselves working with non-native

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English speakers. Examining data over the 24-year period between 1979 and 2003, for example, the increase is dramatic: ELLs as a percentage of the school-aged population increased by more than 169 percent (Francis, Rivera, Lesaux, Kieffer, & Rivera, 2006). That growth has continued.   According to the United States Department of Education, the percentage of ELLS in U.S. schools was even greater during the 2010-2011 school year than it was during the 2002-2003 school year, with ELLs representing approximately 10 percent of the nation's schoolchildren (2013). All projections of the growth of the ELL population point to continued increases as we move towards the mid-point of this century, with some models predicting that ELLs will comprise 40 percent of the school-aged population by the year 2030 (Thompson & Collier, 2002).

Despite the growing numbers of ELLs in U.S. schools, there has been little change in how mainstream teachers are prepared to address the needs of these students (Hollins & Guzman, 2005). Research found that 77 percent of content-area teachers have had no coursework or professional development addressing ELLs (NCES, 2002). This poses a challenge to schools, teachers, and students, since ELLs generally spend about 80 percent of their school days in mainstream classrooms (Dong, 2002). Research indicates that content-area teachers feel the responsibility for developing ELLs' language skills is not theirs, and that the professional organizations that shape the standards and expectations for content education often fail to include ELLs in the discussion (de Jong & Harper, 2005). Further, as of 2012, only five states had made coursework specifically targeting the needs of ELLs in the mainstream classroom a requirement for teacher certification (Samson & Collins, 2012). While the U.S government mandates ESL and/or bilingual education services, most ELLs spend

most of the school day in mainstream classrooms with teachers who are often unprepared to work with them. This makes the preparation of content teachers who are able to effectively meet the needs of ELLs in their classrooms critical to the effective and equitable instruction of a large population of our nation's students.

This article reports on the findings from a graduate-level inquiry-based course co-taught by TESOL and mathematics education faculty, with the goal of preparing teacher candidates (TCs) enrolled in secondary-level mathematics, science, and TESOL teacher education programs to work with ELLs in their mainstream content classrooms and in ESL classrooms through effective implementation of two-way CBI and teacher collaboration. The course was co-developed and co-taught by a TESOL professor and mathematics education professor, and was designed to serve as a pilot for the institutionalization of program restructuring to effectively prepare mainstream STEM educators to work with ELLs in secondary-level content classrooms. The class provided explicit modeling (by the faculty/researchers) and instruction in interdisciplinary teacher collaboration.

The goals of the course were: (1) To support novice secondary-level mathematics/science teachers in teaching ELLs in the mainstream content classroom, (2) To support novice ESL teachers in their ability to understand and effectively engage in CBI, and (3) To support collaborative partnerships between secondary-level ESL and content teachers. Below, we first provide a review of the relevant literature related to teacher preparation, CBI, and teacher collaboration, which form the theoretical basis for the course, and then discuss the course itself and the findings of the research.

Literature Review

The following theoretical perspectives inform the research in which we are engaged: teaching ELLs in content areas through the use of CBI or CLIL; current prevalent practices in ESL and mainstream teacher education in the U.S. related to ELLs' instruction; and the benefits of mainstream and English language teacher collaboration to enhance practice in the ESL and the mainstream classrooms.

Teaching ELLs in Content Areas: Challenges and Promising Practices

English as a second language (ESL) services are mandated by the federal government as a result of the Bilingual Education Act of 1968 (and subsequent reauthorizations and amendments), *Lau v. Nichols*, (decided January 21, 1974), and the subsequent Lau Remedies. However, the U.S. Department of Education has provided only broad guidelines, since education is fundamentally a state-based right, meaning individual states are left to determine how best to provide these mandated services to ELLs. These broad guidelines create a dichotomy: on the one hand, services to ELLs are mandated; on the other, states are left to decide how best to serve their ELL populations, which unfortunately often inspires politically charged discussion. To that end, rather than developing research-based, best practices approaches to educating language minority students, states frequently provide services that placate the largest and most vocal political constituents. Examples of this can be seen in the passage of Proposition 227 in California and Proposition 203 in Arizona, which essentially either outlawed bilingual education and the use of students' native languages in instruction and/or severely limited the types of programs that districts could provide to ELLs through the initiative legislative process (for a full

discussions see Stritikus & Garcia, 2005; Wright, 2005). Putting aside the political nature of the education of language minority students, there are research-based practices that work, and outside of an additive bilingual education setting, the most promising and most prevalent in United States is content-based instruction (CBI). As TESOL International states, "As contrasted with language teaching in isolation, CBI uses specific subject matter on which to base language instruction. In other words, the language is taught within the context of a specific academic subject" (2008, p. 1).

This definition does not distinguish between the provision of these services taking place in ESL or subject-area classrooms: in other words, CBI can enhance both the acquisition of language and content, in either the language or content classroom. CBI can either be content- or language-driven (Met, 1999). In a content-driven approach, content is presented and taught in the second language, which for the purposes of our discussion we will say is English. The learning of content is the primary goal, with the learning of English a secondary goal. The content objectives are driven by the larger curricular goals, and in conjunction with these content objectives, teachers must select language objectives. Students are assessed on their mastery of the content, rather than on language gains. This approach is similar to content and language integrated learning (CLIL), popular in European countries, in which the second language (in this case English) is used to teach material (subject matter) in a classroom setting that is not explicitly a language-learning environment. Language-driven CBI, on the other hand (again summarizing Met, 1999), is the mirror image of content-driven CBI. In this framework, the content is used to learn English, and learning the language is a priority. Learning the content is not purposeful, and occurs as a consequence of the focus on language within a

particular content area. The language objectives are driven by the language (not content) curricular demands, and students are assessed based on gains in language proficiency, not directly on content learning. Numerous research studies have documented the effectiveness of CBI as an integrated approach to learning both language and content.

However, to date most of the CBI practice that occurs, whether content-driven or language-driven, does so in the ESL classroom exclusively, and mainstream content teachers are often unprepared or underprepared to work with ELLs in their classrooms, especially at the secondary-school level. This is critical, since ELLs can face a number of challenges in mainstream content classrooms, and these challenges are multifaceted. First, the language of schooling is frequently very different from the types of communicative language we traditionally strive to develop in a language-learning environment (Schleppegrell, 2004). Second, the prevalent approach to educating language minority students has been to provide ESL services, based on English proficiency levels as determined by state assessments, and to then mainstream the student for the remainder of his or her subject classes.

Finally, academic achievement has been a challenge for many ELLs. We do not wish to present a deficit model of ELLs; however, data show clearly the existence of an achievement gap between ELLs and their native-speaker counterparts. Specifically looking at ELL performance in secondary-level mathematics, the most recent data from the National Assessment of Educational Progress (NAEP 2011) show that only one percent of ELLs scored above the 75th percentile on the eighth-grade mathematics assessment. Moreover, research has shown that as many as 20 percent of all high-school-level and 12 percent of all middle-school-level ELLs have missed two or more years

of formal education since the age of six (Ruiz de Velasco & Fix, 2000), while more than one-third of new ELLs from Latino backgrounds are placed below grade level in school (Jamieson, Curry, & Martinez, 2001). According to Richard Fry, senior research associate at the Pew Research Center's Hispanic Trends Project, "The analysis of national standardized testing scores shows that about 51 percent of eighth-grade ELL students are behind whites in reading and math, meaning that the scores for one out of every two will have to improve for the group to achieve parity" (Fry, 2007).

Content Teachers' Preparedness for Working with ELLs

We believe that the achievement gap, in part, is a result of issues related to the preparation of content-area teachers who spend a majority of the day working with students for whom they have had little to no preparation. Research has concluded that teacher preparation programs are not developing the skills that content teachers need to address both the content and language requirements for these students (Menken & Antunez, 2001). The mastery of the highly specific language of mathematics and science is more challenging when students are learning the concepts and language in a second or additional language (Crandall, 1987). In addition, current models of STEM teacher preparation not only focus on content knowledge, but on the idea that literacy in STEM subjects means that students are able to be active participants in the discourse community of that subject (Roth & Tobin, 2007). In order for ELLs to be active participants, they must acquire the content-specific language skills to do so, and we argue that the best place for this is within the context of the subject-area classroom. However, preparation of mainstream secondary subject-area teachers often fails to include coursework specifically related to working with

ELLs in the mainstream classroom. While, as mentioned above, services for ELLs are mandated throughout the U.S., these students spend much or all of their days in mainstream classrooms (Davison, 2006; Dong, 2002; Leung, 2007; Mohan, Leung, & Davison, 2001) with teachers who may have had no coursework or professional development related to effective practices for these students (NCES, 2002). While individual programs may provide more specific coursework related to working with ELLs, these are the exception rather than the rule. In a large study on the preparation of teachers working with ELLs, researchers found that fewer than one-sixth of teacher preparation programs offered specific coursework to mainstream teachers related to working with ELLs (Menken & Antunez, 2001), while only five states (Arizona, California, Florida, New York, and, as of 2011, Pennsylvania) have adopted teacher certification requirements that include explicit coursework in teacher education programs related to teaching ELLs.

We are not advocating for the elimination of ESL services; in fact, we believe that these services should be expanded. Nor are we promoting a situation in which "every teacher is an ESL teacher." We recognize the value of well prepared and fully certified ESL teachers who provide language and sheltered content instruction for ELLs. Additionally, we strongly support the development and preparation of subject-area teachers who are aware of the needs of ELLs in their classrooms, and are able to differentiate instruction so that *all learners* have access to the curriculum, and the needs of *all learners* are met. We believe that these are complementary services, and that one should not supplant the other. Research has shown that when ELLs are placed in mainstream classrooms with teachers who have inadequate preparation, a number of negative outcomes can arise, including lower levels of academic achievement,

lack of classroom participation, lack of meaningful teacher feedback and peer interactions, and lack of opportunities for meaningful language development (Harper & Platt, 1998; Langman, 2003; Platt & Troudi, 1997; Sharkey & Layzer, 2000; Valdez, 2001; Verplaetse, 2000).

Teacher preparation programs have the power to positively influence TCs' beliefs and practices related to effective instruction of ELLs in the mainstream content classroom. Research has shown that when candidates had some training in working with ELLs, they held more positive beliefs about teaching these students than did teachers who had no such training (Youngs & Youngs, 2001). However, while more preparation in teaching ELLs increases teachers' confidence and skills, as well as builds positive beliefs related to working with language learners, "Many teachers are unaware of linguistic and cultural influences on student learning, [sic] do not consider teaching for diversity as their responsibility" (Lee, Adamson, Maerten-Rivera, Lewis, Thornton, & LeRoy, 2008, p. 42).

Promising Practice: Collaboration Between Mainstream and ESL Teachers

Based on the reviewed literature, the consensus is that mainstream teachers are receiving little to no coursework during their teacher preparation programs. We argue that this plays a role in the aforementioned achievement gap that exists. It is therefore important to develop innovative ways of preparing content teachers to meet the needs of ELLs in their mainstream classrooms. Teacher collaboration is one way to address this, and this promising practice is becoming more prevalent in many parts of the world where language and content learning are integrated.

"Teacher collaboration" refers to activities ranging from informal discussions about shared students to highly structured and formalized co-

teaching models. We see collaboration, therefore, as a continuum, and we define formal co-teaching as the "strong form" of collaborative practice, and the informal discussions that can take place over lunch or in the hallway as the "weak form" of collaboration. Practices that fall in the middle of these extremes can include co-planning lessons, sharing lesson plans and materials, professional visits to each other's classroom, expert consultations (where a content teacher observes the ESL teacher and offers feedback on how more content knowledge might be built, or an ESL teacher observes the mathematics or science class and offers feedback on how language learning can be integrated). Both forms, and the practices that fall in between, offer mainstream and ESL teachers ways to address the needs of ELLs within both the mainstream and ESL classrooms. Effective collaboration, regardless of the strength of the form, refers to activities in which teachers develop partnerships to achieve to achieve a mutually agreed-upon goal (Friend & Cook, 1992).

When reviewing the extant research, the evidence suggests that ELLs and their teachers benefit when collaborative practices exist. For example, the benefits to teachers include increased partnership and reduced isolation, increased efficiency and effectiveness, and the ability to share the responsibilities of teaching, as well as enhanced ability to reflect on practice and enhanced ability to learn from colleagues. Further, collaborative practice allows teachers to engage in a continuous improvement cycle (Hargreaves, 1994). This eliminates the "sink or swim" effect that both content and ESL teachers can encounter when they are required to teach in isolation.

In terms of benefits to ELLs, when content teachers and English language teachers collaborate, the result can be "a shared

commitment to systemic school reform leading to higher achievement and greater multicultural understanding" (Sakash & Rodriguez-Brown, 1995, p. 1). Teacher collaboration also enhances academic outcomes for ELLs: Recent research has found a positive relationship between teacher collaboration and differences among schools in mathematics and reading achievement (Goddard, Goddard & Taschannen-Moran, 2007). Finally, collaborative practices between English language and content teachers can ensure that students' needs are better met than when students are in classrooms where language and content teachers do not work together (Wertheimer & Honigsfeld, 2000).

Despite the benefits, teacher collaboration is not without its challenges. Research specifically looking at the barriers that ESL and content teachers face when engaging in collaborative practices identified issues related to *time, the culture of isolation, teacher positioning, and ESL teachers' knowledge of content* as most commonly inhibiting collaborative practice (DelliCarpini, 2009). Arkoudis (2006) shares that effective collaboration between ESL and mainstream teachers assumes an equitable relationship between these educators from different disciplines, but in fact, ESL teachers are frequently marginalized and have low status in the schools where they work. Because of the status issue, meaningful collaboration can be a challenge, often reducing the English language educator to the status of helper rather than teacher. This result is further confirmed by recent work on interdisciplinary teacher collaboration between ESL and content teachers, which found that ESL teachers feel they are frequently not seen as "real teachers" by either their colleagues or their students, often finding themselves without classrooms (teaching in hallways or converted closets) and lacking resources (DelliCarpini, 2009). The study also

found that when the seeds of collaborative practice were built at the teacher education level, positive changes in beliefs about collaboration and English language teachers emerged, knowledge about how and when to collaborate was developed, and skills related to collaborative practice were enhanced (DelliCarpini, 2009). Based on these findings and the extant literature, it would seem imperative that all CLIL and CBI have an element of collaboration, so that services provided to ELLs in the mainstream and ESL classrooms are complementary.

Tying it All Together: Teacher Collaboration and Two-Way CBI

As stated earlier, CBI frequently takes place in the ESL classroom only, and due to current models of teacher preparation in the U.S., these educators may have little experience with the content that their ELLs will have to master in their mainstream settings. Conversely, mainstream STEM educators frequently have had little to no preparation for working with ELLs. This was clear during a series of classroom observations that the researchers, a mathematics teacher educator and TESOL teacher educator, conducted. First, a mainstream math teacher was observed over the course of a semester. The teacher, whom we will call Ms. J, was teaching eighth-grade mathematics at a public middle school in the Bronx, New York, and all 32 students in her class were ELLs. While the content she was teaching was satisfactory, there was no modification or accommodation made for her 100-percent ELL class, which included some new arrivals who spoke no English, "generation 1.5" students (those who were born in the U.S. to non-native speaking parents, therefore developing the home language as the L1 with English being an additional language) and all levels in between. In our own discussions and review of what we observed, we noted that Ms. J was teaching

everything (all the necessary content) to no one, since none of the ELLs really were engaged; nor were any accommodations, such as sheltering or scaffolding of language, made. The next teacher we visited that semester, whom we will call Ms. R, was teaching middle-school ESL, using the content areas of math and science to engage in the CBI that was required in her school. Over the course of the semester, we observed a linguistically rich classroom with a great deal of language accommodation, differentiated materials, and assignments, but the content was either watered down or not relevant. We concluded that Ms. R was teaching nothing to everyone. In other words, there was no real content learning taking place. This is when we began developing the collaborative practice of two-way CBI.

Two-way CBI builds on and extends teacher collaboration and traditional CBI. It differs from the prevalent sheltered instructional observation protocol, or SIOP (Echevarría, Vogt, & Short, 2000) in that language-driven content objectives (which are enacted in the mainstream classroom) and content-driven language objectives (which are enacted in the ESL classroom) are collaboratively developed and are complementary in nature, therefore eliminating the disconnect that often is present between language and content in the classroom. Two-way CBI also focuses on making both language and content teachers aware of the types of linguistic knowledge necessary for success in STEM subjects, and through collaboration between the mainstream STEM and ESL teachers, the full range of language forms and functions are deconstructed and explicitly developed. This is critical, since research suggests that language objectives are often little more than vocabulary lessons, and do not make the language of the discipline visible (Regalla, 2012).

These complementary objectives take the following forms (DelliCarpini & Alonso, 2013):

Table 1. Complementary objectives

Math classroom Language-driven content objectives	ESL classroom Content-driven language objectives
SWBAT[1] discuss triangle classification using the following sentence starter: Triangle ABC is a (an) _____ triangle because of its angle measures are _____. Students will generate sentences using the classification table (partition-pairs classification) and/or triangle names, (which can act as a semantic feature analysis chart to develop dictionary-like definitions [Alonso & Malkevitch, 2013]) using correct prepositions, conjunctions, and direct and indirect articles with an 80% level of accuracy.	SWBAT associate triangles with their names, during whole group and small group discussions, based on the length of their sides and on the measure of their angles using the following academic terminology: Sides(s), angle(s), length of a side, measure of an angle, base of an isosceles triangle, right angle, obtuse angle, acute angle, isosceles triangle, equilateral triangle, scalene triangle, right triangle, obtuse triangle, acute triangle, equal, unequal, congruent, degree(s).
SWBAT discuss, during whole-group and small-group discussions, their arguments and constructively analyze the arguments of others using the academic vocabulary through oral presentation of their cooperative group activity results with an 80% level of accuracy, measured by the completion of the table and the sentences generated as a result of its completion	SWBAT explain orally, using the academic vocabulary, conceptual hierarchical relationships among different kinds of triangles whenever they exist (is an equilateral triangle isosceles?) as well as to identify and communicate in written and oral forms different ways in which these could be defined as they use different classification criteria.
SWBAT engage in a discussion web activity and reach consensus on how to best classify triangles (traditional or partition pairs), share their group results with the class, then individually write a paragraph, using the academic vocabulary of triangles and triangle classification to defend their ideas on this topic.	SWBAT identify all types of triangles with 100% accuracy, understand the linguistic functions related to classifications as they associate observable features of shapes with a classification criterion with 90% accuracy, and to correctly define all types of triangles with 85% accuracy, as measured by their usage of Venn Diagrams, concept mapping, and other graphic organizers and as they communicate their findings.

These complementary objectives support the learning of the content that ELLs are required to master, and the collaborative development ensures that the activities in the ESL classroom support the learning in the content classroom. Additionally, as teachers engage in joint planning of these objectives, they learn about each other's disciplines and learn to respect each other's roles and jobs, which is one of the barriers to collaboration, as discussed before.

Course Structure

In order to understand the ways in which teacher education programs can effectively prepare mainstream STEM educators for the ELLs they will encounter in their content classrooms, and to develop the skills needed for these educators to engage in collaborative CBI teaching partnerships in their teaching placements, we structured coursework that required STEM educators and ESL teachers to work together to develop content-driven CBI units for the secondary-level math and science classroom, and as a companion, language-driven CBI units for the ESL classroom[2]. In this way, the needs of ELLs in both settings were being met, and both language and content were being developed in highly contextualized ways. Among the lectures and discussion topics are:

- Who are our ELLs?
- Second language acquisition
- L2 teaching and learning: BICS and CALP/language of the discipline
- Cummins Quadrants
- approaches to instruction for ELLs, challenges, and promising practices
- teacher collaboration
- language-driven and content-driven CBI
- reflective practices (Dr. Thomas Farrell as invited speaker)
- teaching experiment and action research

- Common Core State Standards and ELLs
- schema theory; content reading and ELLs
- lexical acquisition: developing academic vocabulary for ELLs
- cooperative learning and oral language development
- text structure, materials, text adaptation, differentiation, and writing
- technology/enhancing CALP through CALL
- and assessment of ELLs/the language factor.

Lectures followed by discussion and a related group activity were at the core of the course; additionally, weekly readings related to the topic and guided reflections on the readings were included in the course discussions, as were experiences from the participants' field placements.

With the purpose of understanding the effectiveness of the instruction from the perspective of the narrative inquiry methodology (reference), the course requires participants to engage in the ongoing development of a framework identifying and assessing ELLs' challenges and their needs in the mainstream classroom, as well as to develop strategies to address these needs. Starting from their own previous experiences, attitudes, and beliefs on working with ELLs, participants through collaborative inquiry, analysis of classroom observations, and reflective discussions and writing problematize the identified needs, re-conceptualizing and re-framing their initial needs/solutions within a theoretical and socio-cultural context.

Course Assignments

1. Position paper: Narrative inquiry drafts develop into a position paper on teaching ELLs.

2. Collaboratively developed content/ESL units of study explicitly addressing the needs identified, using the knowledge and skills gained during the course.

3. Design and/or conduct a teaching experiment/action research paper/discursive approach to educational research.

4. Field observation logs.

5. Guided reflections on weekly readings.

Research Questions

1. What is the effect of explicit coursework on mainstream math and science (MMS) and English as a Second Language (ESL) teachers' attitudes and beliefs on current practices related to the inclusion of ELLs in the secondary-level content classroom and their ability to engage in content-driven content-based instruction (CBI)?

2. How can coursework build the foundational skills needed to engage in effective ESL/mainstream teacher collaboration?

Methodology

The study makes use of a mixed-methods approach that included both quantitative and qualitative data collection and analysis. Data came from several different sources. Proficiencies related to the effective instruction of ELLs in the mainstream classroom were tested at the beginning of the semester (pre-test) and again at the end of the semester (post-test). Quantitative data were obtained from a 25-item, four-point Likert scale pre-and post-course survey addressing research question 1 and analyzed using descriptive statistics. Qualitative data were obtained from reflective writing, position papers (draft 1, draft 2, and final paper), reflective teaching journals and/or field observation journals, and individually or collaboratively developed curriculum materials.

By collecting data from multiple sources, we were able to triangulate and situate the findings within a theoretical framework that adds to the validity of mixed-methods research, provides for a clearer understanding of the issue, and increases confidence in the findings (Jick, 1979).

Researchers' reflective collaborative discussions and continuous analysis, including data analysis from the first iteration of the course and throughout, addresses research question 2. Participants' reflective writing and curriculum materials data were transcribed, coded, and analyzed. The qualitative data were analyzed within a grounded theory framework. Data were coded using an interim analysis framework, and were initially coded separately by each of the researchers. Once the researchers developed inductive codes for the data, the emergent themes were shared and the researchers collaboratively engaged in a second and third round of iterative coding from which core categories were developed.

Participants

This was a pilot study in nature. We report on the findings of 33 participants: 25 in-service and pre-service STEM teachers who had a majority of ELLs in their mainstream content classes or field placements, and eight in-service ESL teachers responsible for teaching sheltered mathematics or science to secondary-level ELLs. During the fall of 2011, the spring of 2012, and the fall of 2012, respectively, seven participants, 18, and eight participants were enrolled in the newly developed course; they were either engaged in level-two fieldwork, which required them to work with small groups of students, or were teachers of record in their own classrooms. The teachers in this study agreed to participate on a voluntary basis, and informed consent was obtained for all participants. **Table 2** summarizes some of their characteristics.

Table 2. Participant characteristics

Cohort	Math	Bil. Math	Science	TESOL	Total	Pre-service	*1-3	*4-7	*8-12	*12+	**NS	No training
1	3	1	3	0	7	4	3				4	6
2	6	0	11	1	18	4	4	3	6	1	10	16
3	2	0	0	6	8			4	4		6	2
Total	9	1	14	1	25	8	7	3	6	1	14	22

* years of experience

** NS = native speakers

Quantitative Data Analysis

At the beginning (pre-test) and at the end of the course the same 25-item, four-point Likert scale survey was administered. The survey contained the following items:

Table 3. Survey Items

No.	Items
1	Including ELLs = positive educational atmosphere
2	ELL inclusion in mainstream benefits all
3	ELLs should not be in general education until they attain a minimum level of English*
4	ELL students should avoid using their native language while at school*
5	Subject-area teachers do not have enough time to deal with ELLs' needs*
6	It is a good practice to simplify coursework for ESL students*
7	It is a good practice to lessen the quantity of coursework for ESL students*
8	It is a good practice to allow ELLs more time to complete coursework
9	Teachers should not give ELLs a failing grade if the students display effort*
10	Subject-area teachers should not modify assignments for the ELLs*
11	Coursework modification for ELLs is difficult to justify to other students*
12	I have adequate training to work with ESL students
13	I am interested in receiving more training in working with ESL students
14	I would welcome the inclusion of ESL students in my class
15	I would support legislation making English the US official language*
16	I allow ELLs more time to complete their coursework
17	I give ELLs less coursework than other students*
18	I allow an ELL student to use her/his native language in my class
19	Effort is more important to me than achievement when I grade ELLs*
20	The inclusion of ELLs in my classes increases my workload
21	ELLs require more of my time than other students require
22	The inclusion of ELLs in my class slows the progress of the entire class*
23	I receive adequate support from school administration to work with ELLs
24	I receive adequate support from the ESL staff when working with ELLs
25	I conference with the ESL or subject area teacher

* Values for these items were reversed in reported data **(Table 4)**

For the first 15 statements, the scale was: (1) strongly disagree, (2) disagree, (3) agree, and (4) strongly agree; the scale for the remaining 10 statements was: (1) never, (2) some of the time, (3) most of the time, and (4) all of the time. In order to interpret gains in participants' beliefs, attitudes, skills, and dispositions, the scale vales were reversed for items 3, 4, 5, 6, 7, 9, 10, 11, 15, 17, 19, and 22 (*).

Overall, pre-post "agree or disagree" cross-tabulation **(Table 5)** shows that participants were more likely to agree with the statements on the post-test than on the pre-test. It turned out frequencies went up significantly (Pearson Chi-Square = 11.089[1], p = .001). Note that Likert scale values 1 and 2 = disagree, while values 3 and 4 = agree, so the differences between pre- and post-test (columns Pt-Pr) are mirror images of each other.

Table 4. Frequency Table

Item/ Response	Pre 1	Post 1	Pre 2	Post 2	Pre 1&2	Post 1&2	Diff Pt-Pr	Pre 3	Post 3	Pre 4	Post 4	Pre 3&4	Post 3&4	Diff Pt-Pr
1	1	0	2	1	3	1	-2	26	19	4	13	30	32	2
2	1	0	11	4	12	4	-8	19	20	2	9	21	29	8
3	3	3	14	6	17	9	-8	14	18	2	6	16	24	8
4	1	2	9	0	10	2	-8	16	16	7	15	23	31	8
5	3	2	12	10	15	12	-3	13	15	5	6	18	21	3
6	7	7	16	9	23	16	-7	7	13	3	4	10	17	7
7	3	5	10	6	13	11	-2	14	14	6	8	20	22	2
8	1	0	1	3	2	3	1	22	20	9	10	31	30	-1
9	4	4	17	19	21	23	2	10	8	2	2	12	10	-2
10	2	1	4	5	6	6	0	17	14	10	13	27	27	0
11	3	0	7	6	10	6	-4	18	18	5	9	23	27	4
12	8	1	12	15	20	16	-4	9	15	4	2	13	17	4
13	2	0	1	0	3	0	-3	16	22	14	11	30	33	3
14	0	0	1	0	1	0	-1	21	23	11	10	32	33	1
15	7	4	14	16	21	20	-1	6	6	6	7	12	13	1
16	4	2	7	13	11	15	4	14	11	8	7	22	18	-4
17	0	1	5	0	5	1	-4	14	12	14	20	28	32	4
18	4	2	19	14	23	16	-7	4	10	6	7	10	17	7
19	4	4	9	9	13	13	0	17	18	3	2	20	20	0
20	4	3	14	15	18	18	0	11	9	4	6	15	15	0
21	4	3	13	10	17	13	-4	13	16	3	4	16	20	4
22	0	1	6	5	6	6	0	18	17	9	10	27	27	0
23	11	9	11	12	22	21	-1	7	7	4	5	11	12	1
24	7	4	13	12	20	16	-4	8	13	5	4	13	17	4
25	13	13	6	5	19	18	-1	9	12	5	3	14	15	1

Table 5. Count (15 Items-33 participants)

Agree or Disagree Cross tabulation			Disagree	Agree	Total
PREPOST	Pre-test		331		825
	Post-test		266		825
Total			597	1053	1650
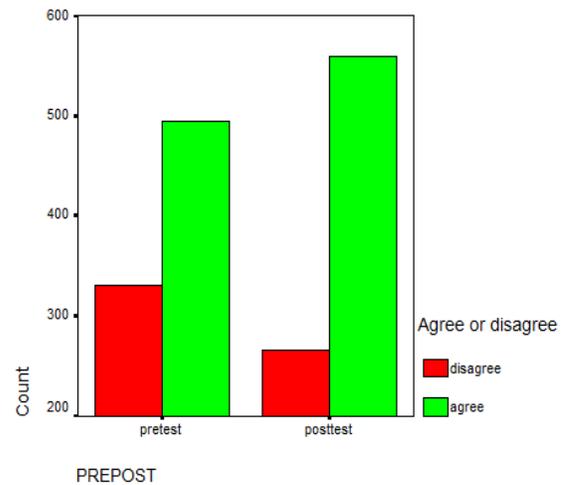
There is a subtle difference between the first 15 survey questions and the remaining ten. While both of these groups of items are intended to measure participants' beliefs, attitudes, skills, and dispositions regarding working with ELLs, the latter reflects actual implementation of such proficiencies; therefore, while it was expected that data would reveal some gains, they should be still underdeveloped, and are supposed to follow participants' changing beliefs. Our teaching during the intervention implementation did not focus on asking participants to recite statements like the ones used in the survey, but rather was designed to facilitate students in coming up with their own positions on how to address meeting ELLs' needs. The aforementioned assumption is corroborated by the data analysis, as illustrated by the corresponding Chi-Square values and cross-tabulation tables below. For the first group of questions, frequencies went up significantly (Pearson Chi-Square = 10.898[1], p = .001, **Table 6)**, while for the second group, although frequencies went up, there are no significant differences (Pearson Chi-Square = 1.776[5], p = .183, **Table 7).**

Table 6. Count (First 15 Items-33 participants)

		Agree or disagree Cross tabulation		
		Disagree	Agree	Total
PREPOST	Pre-test	177	318	495
	Post-test	129	366	495
Total		306	684	990
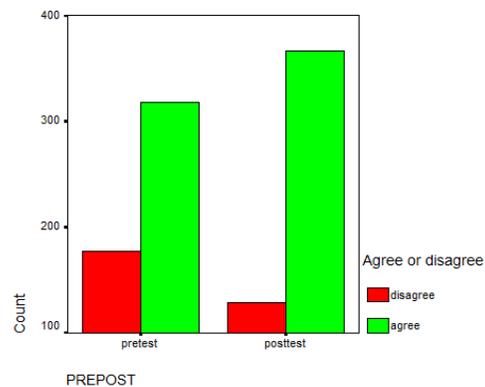
Table 7. Count (Last 10 Items-33 participants)

		Agree or disagree Cross tabulation		
		Disagree	Agree	Total
PREPOST	Pre-test	154	176	330
	Post-test	137	193	330
Total		291	389	660
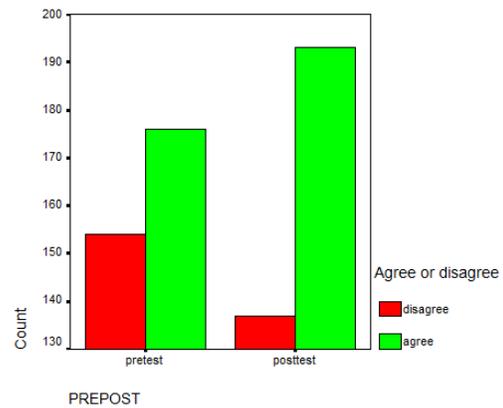
The frequency table **(Table 4)** reveals that major gains were related to items 2, 3, 4, 6, and 18, while drawbacks are more marked on items 8, 9 and 16.

Qualitative Data Analysis

The core categories that emerged from the qualitative data analysis supported the findings from the pre-course survey. First, we found that the mainstream teachers generally held a deficit view of ELLs at the start of the class. There was a "blame the victim" mentality, and the participants generally felt that academic achievement was solely the responsibility of the student and his or her family, while any failure in that area was attributed to a number of personal factors. Many teachers wrote about and discussed who was responsible for the achievement gap between ELLs and their native-speaking counterparts. One participant shared:

> I believe that many factors are responsible for the poor achievements by ELL students in the urban school settings in the United States. For example, many of the students' parents are non-English speakers, and if they are, they are not academic literates, which makes it a big problem for students at home because they speak their parents' language rather than mainstream English. Some students have intrinsic behaviors and they learn because they want more for their lives; others like myself are extrinsic because we use motivation by others to achieve good results, but some of the students are simply lazy. (Initial position on ELLs in mainstream classrooms. Michael[6], high-school science)

This teacher clearly felt that the blame for what he terms "poor academic achievements" should be placed on non-native English-speaking parents, who may lack academic literacy skills in their first languages, resulting in input that is not aligned with the language of schooling in the U.S. He also talks about motivation, saying that some "students are simply lazy." Many of the participants shared this view. The beliefs that teachers have about language minority students have a profound impact on student learning outcomes (Valdes, 2001). When teachers have negative attitudes that are influenced by ethnocentric views or underlying racism, or when they believe that the lack of student success is the fault of the learner and not the responsibility of the teacher or the school system, students' academic and social needs are not met, and school becomes a negative experience, rather than a positive one

(Tse, 2001; Valdes, 2001; Youngs & Youngs, 2001). Such beliefs and such strong deficit views of ELLs must be explored, challenged, and ultimately changed at the teacher education level in order for this growing population of learners to have access to and achieve success with the mainstream curriculum.

It was also found that the mainstream teachers initially had low levels of understanding regarding the needs of ELLs, but they desired more knowledge of these students in general. One teacher shared;

> Mainstream teachers need to know more about their students then [sic] their name; though their names can tell you a lot—it doesn't help you understand the cultural difference, language difference, and perhaps even the environmental language compared to content language. (Emma, secondary-level math; reflective journal entry)

This entry illustrates two key points. First, this teacher is aware of the need to know more about the ELLs in her classroom; second, and importantly, it highlights the superficial understanding that many mainstream teachers have about the culturally diverse students in their classrooms. Emma suggests that you can gain information about a student's culture and language by his or her name, hinting at the notion that teachers can assume a great deal about a student based on name. This is a very superficial view of cultural identity. The problem is that while Emma realizes the need to know more about her students, thinking about that in terms of labeling students based on the ethnic origins of their names, even as a place to start, helps to perpetuate a superficial view of culture and the role it plays in teaching and learning, and creates a monolithic view of the diverse learners teachers encounter. For example, in New York City, where a majority of

ELLs speak Spanish as a first language, that first language may be the only element these students share. The cultural diversity represented within this group is immense, and to group these students as one is a mistake. Taylor and Sobel (2001) found that novice teachers are challenged in their ability to understand and work with their students' diverse cultural and linguistic backgrounds, and are therefore unable to engage in effective classroom practices for these learners. The issue of understanding students' cultural identities is critical to all educators, but is especially so in a CLIL approach to instruction. As Coyle proposes, "The role of 'culture' in CLIL is fundamental if we are to achieve intercultural learning and understanding" (2009, p. 105).

Another core category that emerged was that of a lack of knowledge regarding the role of language in the mainstream, content classroom. While the participants were math and science teachers, and these are disciplines with subject-specific vocabulary and discipline-specific ways of making meaning, there was surprisingly little knowledge of the importance of building the academic language needed to be successful in the class. Participants also seemed to believe that they had no role in building these language skills for their ELLs:

> Mainstream teachers tend to remain unaware of the role of language plays in the classroom, in fact, when I consider this myself I begin to realize how perhaps some of the words I use may have double meaning. Perhaps a class or working with ELL teachers, [sic] can better give the teachers—us [content teachers], the skills we need to not leave them behind. (Emma, secondary-level math, reflective journal)

While the focus in U.S. content-teacher preparation programs is on the development of

content knowledge, teachers also must acquire the pedagogical knowledge and skills to facilitate the development of the types of academic language, namely the language of math and science, that will enhance students' potential to succeed in these subjects. This development of appropriate academic language is critical for all learners, but ELLs have unique needs of which mainstream teachers must be aware. When we think of effective mathematics and science classrooms, a linguistically rich environment should be what we imagine: An environment where the teacher provides a foundation in language and concepts, and facilitates inquiry-based construction of knowledge. The types of language needed to gain mastery lend themselves not only to the development of mathematical content knowledge, but also to the development of language in general for ELLs. de Jong and Harper (2005) address the issue of preparing mainstream teachers to work with ELLs, and point out that although the professional organizations that govern these disciplines have clearly articulated the content and concepts essential to understanding the development of content knowledge, as well as the sound pedagogical practices needed to facilitate learning, they

> ...Fail to explain the linguistic foundation underlying these effective content classrooms. Yet students are expected to learn new information through reading texts, participate actively in discussions, and use language to represent their learning by presenting oral reports and preparing research papers. These extraordinary language and literacy demands remain invisible. (2005, p. 102)

The teachers in the present study were aware of the content knowledge that they must teach, but were largely unaware of the role that language plays in the development of this

knowledge. Bailey, Burkett, and Freeman (2007) provide an excellent illustration of this very dilemma:

> The problem is that classroom participants generally do not appreciate how deeply embedded teaching and learning are in language use. Like water for the fish, language is so fundamental and encompassing in classrooms settings that it becomes transparent. (p. 609)

Conversely, the ESL teacher in the study, who was teaching secondary-level ELLs mathematics in a sheltered environment, was aware of the role that language played in the development of content knowledge, but unsure of how much content to focus on, and found the balance between the language and content focus challenging to meet. Integration of language and content was a challenge for this teacher:

> It is difficult to incorporate vocabulary, expressions, and other aspects of the language to [sic] the Mathematics [sic] classes, but I believe if this is done correctly it can greatly help students. Every class I teach, I have to introduce at least two new words and I have to review many of them as I explain a concept or procedure. I have a hard time deciding when to focus on content and when to focus on language. I know that we are aiming for a totally integrated approach, but this is not easy for me to accomplish. I feel like I have to switch between language and content lessons in the same class and I know that the students don't get enough of both when this happens. This is an area that needs improvement in my own teaching. (Paloma, bilingual/ESL math; reflective journal)

Paloma struggles with balancing language and content teaching in her sheltered math class. More nuanced understandings of the language of schooling have developed in recent years (Schleppegrell, 2004), and ESL teachers have had to change their role from primarily that of a language teacher, whose responsibility was to build communicative and social language skills, to a teacher who must integrate content and language (Harper & de Jong, 2009). Harper and de Jong discuss how national and local policies in the U.S., along with revision of the TESOL P-12 standards, have created a situation in which ESL teachers must offer content support in areas beyond English language arts. Paloma is responding to these demands by working to balance content and language in her secondary math classroom, but is experiencing challenges in doing so. One of these challenges stems from how ESL teachers are prepared in the U.S. While program requirements vary, many ESL teacher education programs require only a liberal arts and science core. This may amount to as few as three to six undergraduate credits in entry-level courses in mathematics, science, history, and literature. Contrast this with the usual 30- to 36-credit major required for subject area teachers. With the increased demands on ESL teachers to engage in CLIL, their preparation in the specific subject areas becomes an issue. ESL teachers may have little actual knowledge or skills with the *content* of CBI, and therefore other interests may drive the focus in ESL classes, rather than actual content needs. While this is acceptable practice when focusing on communicative and social language development, it fails to meet ELLs' academic language development needs. Enhancing teachers' knowledge of and skills in interdisciplinary teacher collaboration through teacher education programs is one way to address this challenge.

When looking specifically at the participants' understanding of and ability to engage in collaborative practices at the beginning of the course, we found that a declarative knowledge of collaboration was present in all participants, but this did not translate to a procedural knowledge of ESL/mainstream teacher collaboration. Generally, all participants saw collaboration as a positive practice, but knowledge of how to engage in it was lacking. This can be seen in the following excerpts:

> The ESL teachers are a vital resource, because they bridge the language gap between the teacher and the student. They can properly assess the student's education and language and help you adjust your lesson plans to meet the needs of that student. (Kayleen, secondary-level biology, reflective journal)

> I'm not exactly sure how I could work with the ESL teacher in my school since she doesn't know science. (Michael, high-school biology, "needs of ELLs" paper)

Discussion

Changes in Beliefs and Practices

Our goals for the course were to prepare mainstream educators to integrate language and content instruction in the secondary-level math and science classroom through content-focused CBI, to prepare ESL teachers to effectively engage in language-driven CBI, and to develop the knowledge and skills necessary to support collaborative partnerships between ESL and content teachers. Throughout the course data were continually collected in the form of reflective writing, teaching and field observation journals, and focus group discussions. At the end of the semester the post-course survey was administered. Data were analyzed to determine

general trends and changes over time, and to compare the significant differences in participants' beliefs and practices between the beginning and end of the term. Looking specifically at the trends that emerged from the quantitative data and comparing pre and post survey responses' frequency differences, we see that TCs had significantly changed their beliefs and practices, developing more positive beliefs about ELLs in the mainstream content classroom, the benefits that the inclusion of ELLs in mainstream can bring, the necessity of certain minimal English requirements prior to being placed in the content classroom, the use of ELLs' native languages in the classroom, the responsibilities of mainstream teachers for ELL education, and about practical issues related to the simplification of coursework for ELLs (to lessen and simplify). While they generally had mixed feelings about whether coursework modification for ELLs slows the progress of the entire class, and subsequently about allowing ELLs more time to complete their work (most significant negative gains, item 16), and while many confounded achievement with efforts, it became easier for the TCs to justify the coursework modifications to other students. While there was still a feeling of having had less-than-adequate training for working with ELLs, the content teachers sought help from ESL staff when working with ELLs, and enhanced their views on the importance of the role of the ESL teacher.

In terms of the qualitative data, we will focus on changes that emerged from three core themes: teachers' beliefs and responsibilities, development of academic language, and collaborative practices. One major change was that the deficit view of ELLs held by the participants at the beginning of the semester changed to an understanding of the shared responsibility and role of educators in their success:

All teachers are responsible for assisting ELLs with the acquisition of oral language and academic language. (Sofia, secondary biology, final position paper)

> Teaching mathematics to ELLs is about a commitment to set and maintain high standards based on sound pedagogical principles using data based research, state of the art technology, and effective collaboration techniques. When all of these techniques are combined it becomes a formula for student success. (Oliver, secondary-level math, final position paper)

The participants revised their views on the responsibility of the school system and teachers in educating ELLs in the content areas, and came to believe that when these students did not experience educational success it was not because they were in some way the problem, but because the system had to adjust to meet their needs. Additionally, there was an understanding that all teachers are responsible for all students, rather than ELLs being the sole responsibility of the ESL teacher. This is a significant change from the belief that teaching ELLs is not the responsibility of the content teacher, and that the work would be accomplished elsewhere, as has been found in prior research (DelliCarpini, 2009a; DelliCarpini & Gulla, 2009b; de Jong & Harper, 2004, 2005; Short, 2002). When all teachers share the responsibility of educating all learners, the marginalization that ELLs and their teachers can experience decreases, and shared responsibility leads to shared accountability.

By the end of the semester, rather than merely expressing that knowledge is necessary in a somewhat passive way, participants described *how* they could gain that knowledge, therefore becoming agentive.

Introduce yourself to the ELL teacher, the math coach, the IEP counselor, and the counselor and get all of their insight and thought on the student and their progress. If the language is what eludes you, introduce yourself to [the] administrator of the foreign language department if it's a high school, if in a middle school I suggest finding a translator tool that you and the student will always have quick access to. If the language is Spanish, as in my single experience as a teacher, find someone willing to translate. The IEP teacher actually provided me with Spanish text for the ELL student. (Emma, secondary-level math, final reflection)

Mainstream teachers' knowledge of linguistically and culturally diverse learners is essential to effective teaching practices (Banks, Cochran-Smith, Moll, Richert, Zeichner, LePage, Darling-Hammond, Duffy, & McDonald, 2005). When mainstream teachers understand this need and are able to be agentive in their acquisition of knowledge about the diverse learners they are working with, effective practice can become a reality. We also found an increased understanding of the role of language in the acquisition of content on the part of the mainstream teachers:

Content teachers play a key role in helping ELLs develop essential strategies for deciphering words in English. I will provide ample opportunities for discussions, presentations, reading and writing tasks. Various exposure and methods for practicing vocabulary will strengthen ELLs' reading and language skills as well as science skills. (Sofia, secondary-level science, reflection, November)

The acquisition of the language of the discipline is essential to the acquisition of content knowledge, and many ESL programs in the U.S. have been reorganized to account for this demand (Nunan, 2005; Richard-Amato & Snow, 2005). TESOL has revised the P-12 learning standards to reflect the importance of the acquisition of the types of language ELLs need to be successful in their subject-area classrooms (TESOL, 2006), which is a shift from earlier models of social language development. Teachers must be aware of the language of their disciplines, and of how these linguistic demands impact ELLs in their classrooms.

In terms of the balance between language and content instruction, the ESL teacher in the study felt better prepared to engage in language-focused CBI:

In mathematics, you cannot teach content if the students do not have the appropriate vocabulary. As one of the articles stated: "Mathematics has more concepts per word, per sentence, and per paragraph." There is a solid interconnection between the content and the vocabulary, and this is where I need to help my students. If the students already have the knowledge in Spanish it is only a matter of transferring the content into the L2, but if the students do not have the previous knowledge, there is where the challenge lies. I have to start teaching to them the basic vocabulary in Spanish and then transfer the knowledge to English after they have understood the concept. By teaching this way I can balance language and content when I do CBI. (Paloma, bilingual/ESL math; reflective journal, November)

Paloma's increased efficacy in integrating language and content in the ESL math classroom is a critical finding. If ESL teachers are to meet the needs of their students, but these students

are unable to be successful in their mainstream classrooms because they have not developed the requisite language skills to do so, then we are failing students in all contexts. ESL teachers must be able to effectively engage in language-driven CBI, with the focus being on the foundational types of academic language needed for success in the mainstream classroom. As Harper and de Jong point out, "The move towards content-based language and sheltered content teaching as well as increased attention to the linguistic demands of mainstream classrooms represent a significant shift" (2009, p. 141), and ESL teachers must be adequately prepared to respond to these evolving demands.

In terms of changes to participants' beliefs about and ability to engage in collaborative practice between ESL and content teachers, we found that while participants did have a favorable view of collaboration at the outset of the course, they did not have a clear understanding of how to engage in such practices. At the end of the course, they had increased understanding of the critical role of interdisciplinary collaboration, and importantly understood how to go about forming these partnerships:

> These partnerships that are formed with the different content area specialists will play an important role in both content area knowledge and literacy acquisition. The communication between Mathematics [sic], ELA, TESOL, and other subject teachers can provide success stories that will guide your students to both L2 and mathematics content success. (Oliver, secondary-level math, final position paper)

> Collaboration with ESL teachers can improve a student's success. With my lessons prepared in advance, I will give a vocabulary list of science content words to the ESL teachers. As a team, both teachers can help ELLs feel comfortable with vocabulary. Having the same vocabulary list instructed by two distinct teachers, [sic] will further enhance students' comprehension. If ELLs are previously exposed to new vocabulary, they may feel more comfortable in reading and interpreting a text. (Sofia, secondary-level science, final reflection)

When looking at the academic success of ELLs, both language and content must be equally taken into account. One cannot be sacrificed at the expense of the other. As we have emphasized in this article, and as other researchers have discussed, content teachers are not language teachers, and ESL teachers may have limited knowledge about the content that their ELLs need to master. Collaboration seems to be a necessary component of any solution to such a dilemma. When ESL and content teachers engage in collaborative practice, both teachers and students benefit. In an age of accountability and standardized testing, when ELLs are required to perform at the levels of their native-speaking counterparts, English language and content teachers must collaborate to ensure that students are successful (Creese, 2005, 2006; Davison, 2006).

Conclusion

We developed this course as a pilot to begin address the needs of the growing populations of ELLs that mainstream math and science teachers are facing in their classrooms, and the demands on ESL teachers to engage in CBI that addresses actual academic requirements. Neither set of teachers, mainstream or ESL, is adequately prepared to meet these demands. The general findings, based on this pilot semester, indicate that content teachers showed positive changes in beliefs and knowledge

related to working with ELLs in the mainstream classroom. In addition, the ESL teacher who participated was better able to understand her role *vis à vis* integrating language and content effectively, while all TCs developed a deeper understanding of collaborative partnerships between ESL and content teachers.

As a result of our findings, we have moved forward in institutionalizing the class within the department. Based on the success of the initial offering, we have expanded the number of TCs enrolled in this course to 33, math/science/TESOL, during two additional iterations. We have revised the initial syllabus and refined the course assignments to include additional readings and expand cooperative learning classroom activities that enhance participants' reflective and collaborative practices, as well as to engage participants in designing and implementing action research projects for their students. The researchers/instructors have sought to increase the number of curriculum materials that explicitly address the implementation of the Common Core State Standards in an environment where a teacher must also develop the academic language of all students and attend to the needs of ELLs. Enrolled TCs, overall, will dramatically increase linguistic knowledge related to the development of academic language proficiency for second-language learners. Additionally, we have submitted a number of grant proposals to support the development of the course and research, and to support our further development of more effective models of teacher preparation and two-way CBI. An example of this, resulting from the initial findings, is the development of a pilot interdisciplinary practicum component into the system so we can fully analyze the effects of the course. This component will authenticate the gains TCs demonstrate in identifying, understanding, and addressing the needs of

ELLs within a CBI framework, and developing a greater sense of efficacy in terms of their ability to engage in beneficial collaborative partnerships; it would aid in the creation and implementation of curriculum materials for both the mainstream and ESL classroom.

Effective integration of language and content has the potential to create successful learning environments for ELLs through the meaningful acquisition of the academic subject under investigation and the academic language needed to communicate effectively within that subject. Both ESL and content teachers face challenges in understanding and implementing CBI effectively. The initial findings from this research and the ongoing project can impact teacher education in meaningful ways. Students whose first language is not English are a growing part of the educational landscape in the U.S., and many parts of the world are working to develop effective practices for English language instruction. It is no longer acceptable for teachers of other subjects to have little to no knowledge of the issues related to the education of ELLs. When teachers are prepared to teach all learners they encounter in their classrooms, educational success and attainment are raised for all learners.

Notes

1. Students will be able to (SWBAT).
2. For a full discussion of content- and language-driven CBI, see Met, 1999.
3. 0 cells (.0%) have expected count of less than 5. The minimum expected count is 298.5.
4. 0 cells (.0%) have expected count less than 5. The minimum expected count is 153
5. 0 cells (.0%) have expected count less than 5. The minimum expected count is 145.5.
6. All names are pseudonyms.

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