

A review of research on professional development for teachers of English language learners

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English language learners (ELL) are among the fastest growing K-12 student population. Latino students make up the majority, with 77% of all ELL students claiming Spanish as their primary language (Kim et.al. 2011, p. 232). At the same time, there has been a widening gap between ELL students and performance on standardized tests; more ELL students are falling behind. To magnify the problem, teacher preparation to address this gap is lagging and a scarcity in the literature confirms the educational system's struggle to address the issue (Chval, Pinnow, and Thomas , 2015, p.103). In recent years, there has been a shift in the professional development among teachers concerning accountability, student expectations and performance in standardized tests, and training.

Due to the language barriers that ELL students face, educators have created many programs designed to elevate ELL student performance in classroom settings and for standardized tests. As Lee et. al. (2008) point out, the No Child Left Behind Act has portrayed the rigorous testing in education as a "high-stake" assessment, placing pressure of teachers to make sure their students perform well (p. 42). As a result, many professional development programs for teachers and students address diverse subjects, such as English and science. These programs nurture specific strategies to elevate student test scores, alter the paradigm in which teachers approach education and lesson planning, or both. However, despite these good intentions, the results have been largely mixed. While professional development programs and student interventions have created successes in certain cases, the correlation between ELL students and their low performance continues to vex educators. Many of the programs experience success in controlled classroom settings, but studies need to take into account larger political and

economic concerns, from budget cuts and changes in educational politics, to the larger concerns about ELL students and the urban environment in general.

Focus on Teachers: Attitudes and Adjustments

Instructing ELL students creates a challenge for teachers and students due to the language barrier. At the same time, the perception of ELL students in general can create additional obstacles. As Hart and Lee (2003) point out, many ELL teachers are “unprepared to integrate English language and literacy” with their lessons and they have “only a rudimentary understanding of this interpretation” (p. 478). According to Ross (2014), many math teachers are wary of ELL students, and, as a result, experience reduced self-efficacy when working with these students. In addition, as Carrejo and Reinhartz (2014) note, the educational terms of “English literacy” and “science literacy” vary. There are many definitions of science literacy, including curiosity and inquiry about natural phenomena to problem solving and communication (p.335). As Hart and Lee (2003) observe, many teachers took the concept of English literacy literally, meaning “reading comprehension” and “read on grade level” (p. 488). As a result, many professional development programs aim to educate teachers about how linguistic and cultural diversity can shape a classroom environment.

Kibler and Roman (2013) point out that these programs may not succeed in changing teachers’ opinions. Indeed, many of teachers’ outlooks on education depend on their individual temperament. Kibler’s and Roman’s (2013) study follows two teachers, Carmen and Janice, as they simultaneously undertake the same online professional development course to become certified to teach in an ELL classroom in California. The course involves viewing of online videos of classroom instruction, doing the assigned readings from the fields of linguistics, studying educational theory pertaining to ELL students, and conducting online discussions with

other instructors. This 27-week long program ultimately involved three-course series, with a focus on native-language use in the classroom. As for the subjects, Carmen and Janice were strangers who did not know each other. Carmen was a novice kindergarten teacher while Janice was an experienced secondary school instructor.

Although both Carmen and Janice took the same program, they emerged from the course with different views. Carmen was energized by the experience, as it affirmed her outlook on ELL and native-language integration. She looked forward to implementing linguistic differences and students' native languages in the classroom. She believed this would generate greater understanding among the pupils and herself. Janice, however, did not feel that the course justified the use of native-language use in the classroom. Drawing from experience, she did not believe that her largely teenaged students would change their behavior simply because she attempted to speak in their native tongue. Janice changed her mind, however, when the school context altered. The growing Latino population in California all but required that she utilize Spanish in her daily classroom setting and her school district agreed to fund teachers learning secondary languages. Although Janice came to agree with the policy, it was not through the online course's instructions. The authors conclude that the teachers' career trajectories, and institutional settings and support can impact the way teachers regard native-language instructions.

Teacher Development

However, educators have recently recognized the importance of not only teaching students, but incorporating language into their teaching strategies to cater to an indigenous culture and improve classroom performance. Rather than try to make ELL students conform to an unyielding classroom environment, teachers themselves can serve as agents of change by

improving or changing their teaching strategies. As Braecher, Rorimer, and Smith (2012) point out, the increasing departmentalization of high schools and educators creates a lack of collaboration as many faculty work in isolation. As a result, teachers are unable to coordinate instruction planning.

To rectify this education gap among teachers, many educators undergo training and professional development workshops. Hart and Lee (2003) study six urban elementary schools in the southeast during the 2001-2002 school year, including 53 third- and fourth-grade teachers and 1500 students (Hart and Lee, 2003, p. 480). Through the Literacy in Science Instruction program, the teachers were trained in science curricular materials and teaching strategies workshops to integrate these lessons in ELL classrooms. Through group interviews and classroom interviews, Hart and Lee (2003) witnessed teachers learning that “literacy” did not just mean engaging with the English language to read and write, but contextualized in science, such as creating graphs and visual media, participating in science fairs, and conducting experiments.

Braecher, Rorimer, and Smith (2012) have addressed the educational gap among ELL students through a more informal means. Their study examines local video-sharing as a means of faculty peer coaching. Some organizations, such as Teacher Collaborative Inquiry (TLC), are teacher-led programs, designed to generate conversations among teachers to share strategies, network in mentor-mentee relationships, and provide examples of classroom observations (p. 51). In their study of a New York high school, Braecher, Rorimer, and Smith (2012) observed seven teachers meeting after school during one academic semester to examine videos of teaching-strategies provided by the administration. The teachers not only critiqued these videos, they created their own clips to share within the group to elicit discussions and generate feedback. Through this informal program, teachers were able to specifically see their personal strategies

presented in video format, from which they can observe and understand their own teaching practices as they relate to ELL (and non-ELL) students. Despite initial reluctance at seeing themselves on camera, teachers saw the “openness” of seeing themselves in action as a means to create positive growth. In an interview, one teacher stated ELL students were underachievers because they thought class was “boring.” By seeing the teacher from the class’s perspective, teachers can make “a few, small adjustments [to] dramatically increase student engagement, thus eliminating classroom management issues” (Braecher, Rorimer, and Smith, 2012, p. 57). In their study, Chval, Pinnow, and Thomas (2015) point out that one teacher who mounted cameras on her pupils’ heads (but did not discuss these videos with a group), gained similar insights into the child’s perspective (p.121). By changing instruction patterns, teachers could foster interest rather than use disciplinary actions.

Other programs encourage teachers to directly broaden their understanding of their pupils’ backgrounds. One study by Johnson, Bolshkova, and Waldron (2016) examined the traditionally-low performance of Latino ELL students in math and science. The study addressed the issue of whether non-Spanish speaking instructors had the capability to teach Latino ELL students math and science. Teachers of minority students “are not prepared to enact strategies that infuse culture and language,” regardless of their expertise in the field (Johnson, Bolshkova, and Waldron, 2016, p.477). The Transformative Professional Development (TPD) in the American Southwest was designed to build a language bridge by teaching instructors conversational Spanish during the summer. Four middle school teachers who taught math and science took summer classes for a total of 320 hours, while teachers in six elementary school teachers took courses in Spanish language and in science curriculum. The program aimed to

immerse teachers, all of whom were Caucasian except for four Hispanics and one Asian, within Spanish culture and use this foundation to interest ELL Latinos in science and math.

Through field observations and interviews, Johnson, Bolshkova, and Waldron (2016) conclude that language played a significant role in generating interest among students from grades 4-8. TPD teachers were able to devise new strategies in Spanish that took advantage of their pupils' backgrounds. One teacher stated, "You have to know where they are, where they are coming from. And you need to incorporate culture into your teaching...make them feel more comfortable. Make them want to come to class" (Johnson, Bolshkova, and Waldron, 2016, p. 494). This attitude changes on the part of teachers permeated throughout the campus, creating a more welcoming atmosphere. The study also notes ELL students gained new interest in math and science, which was reflected in improved state assessment tests.

Student Orientation Programs

While many professional development programs draw attention to the ways teachers approach the classroom, other programs center on student activities. Carrejo and Reinhartz (2014) attempt to find a common ground between science and language by using the approaches advocated by Chamont and O'Malley (1996). This methodology included physical and mental manipulation of material in order to stimulate thinking and identifying words with certain visual cues (Carrejo and Reinhartz 2014, p. 336). Using a pool of thirty-five elementary public school ELL classes, the authors witnessed pupils engaging in hands-on activities to identify characteristics of minerals, fossils, and other terms. They concluded that "engaging and verbalizing" and "experimenting as communicating" led ELL students to perform higher on standard test scores (Carrejo and Reinhartz, 2014, p. 342).

Lee et.al (2008) build on the work by Hart and Lee (2003) by developing a five-year PD in a Florida school district for third-, fourth-, and fifth-graders. This program is designed to stimulate student interest in science, math, and English, by contextualizing the lesson plans in exercises centered on the real world. Curricula such as “Water Cycle” allow students to conduct hands-on experiments with water, allowing them to see “science at work” and quantifying these lesson plans with math-heavy measurement exercises and analyses. In addition, English terms, such as “precipitation” are defined and explained in visual cues, such as graphs, photographs, and video instruction. One teacher described the success of this program: “Better helps abstract math. It’s more concrete when the kids have things to manipulate and have hands-on materials” while others commented on how students now recognized science, math, and English went “hand-in-hand” (Lee et.al, 2008, p. 57-58). This “student-oriented,” positive approach was translated into higher test scores, demonstrating the success of this integrated approach.

One model for English-literature reading and comprehension is the Pathway Project, which is a professional development curriculum designed to train teachers, especially in the middle and high school ELL levels. The Project focuses on student reading and comprehension, encouraging students to read texts and then write thoughtful, well-organized analytical elements about those texts. Students are encouraged to create clear theses that focus on characterization, settings, literary symbols, and connect these elements to a larger theme. Teachers themselves undergo forty-six hours of intensive training sessions, distributed across the school year. The end objective is to increase student performance in standardized reading and writing test scores, especially the California English Language Development Test (CELDT) and California Standard Testing (CST).

Kim et.al (2011) looks at one implementation of the Project from 2008. Their study included one hundred teachers and two thousand ELL students, primarily, Latino, in fifteen secondary schools in the Sana Ana Unified School District in California. Specifically, teachers tested students for use of “writing hooks” or slang words such as “kinda” and “cuz” (Kim et.al, 2011, p.241). The study found that students in the Pathway program scored higher on reading and writing, with a mean CST score of 327.66 score to the control score of 325.60 (Kim et al., 2011, p. 247). However, while the Pathway Project seemed to have played a significant impact on the total CST score, the CST writing and subset scores did not vary significantly across grades and in randomized groups (Kim et.al., 2011, p. 249). Despite the limitations of one study of one local group affords, they conclude that the Pathway Project did create a positive impact, but no more than other professional tutoring services directed toward improving English reading and comprehension skills.

Not all classroom strategies require an intensive program. Chval, Pinnow, and Thomas (2015) look at how an individual teacher could foster English language skills and math skills among ELL through simple lesson plans. In their case of Courtney, a third-grade teacher who had little training as an ELL instructor. However, Courtney agreed to integrate English language skills into math planning lessons. She used math problems to illustrate the definitions of words (i.e. to “loose” as in a single item, “loose” as in not wound up tightly, and “loose” as in to escape from a cage) can change the context of a math problem. A “loose” t-shirt signifies a single item, but a “loose” marble means a loss of a toy for a child (Chval, Pinnow, and Thomas, 2015, p. 116). The notable aspect of Courtney’s lesson plan was that there were no fancy gimmicks involved. Unlike the science booklets and water measurement experiments supplied by Lee et.al (2008), Courtney was able to integrate lessons single-handedly and at literally no-cost. She

explained concepts simply through the use of math and the vocabulary words. From here, Courtney could group her students in small-groups and use simple pictures or props to explain what she means, and how those word choices reflect mathematical concepts. As Chval, Pinnow, and Thomas (2015) argue, Courtney did not need to devise new curricula in the form of text books and educational theories; she focused on “enhancing the language of existing curriculum materials,” from which she added her own ideas as she built confidence (p. 118). By creating what the authors describe as “authentic contexts” for her lesson plans, Courtney bridged the academic environment with real-world scenarios the children were accustomed with.

Several studies showed that teacher and student efficacy levels could rise simultaneously. Carrejo and Reinhartz (2014) point out that science literacy and English language skills can be developed simultaneously. Using concrete materials, such as hands-on experiments and texts create visual stimuli which allowed ELL students to remember concepts through a real-world context (p. 345). They argue that without these hands-on activities and contextualized instruction, “the science and language literacy achievement gap for ELL will continue to widen” (Carrejo and Reinhartz, 2014, p. 346).

Carrejo and Reinhartz discuss their study within a simple classroom setting. Li and Peters (2016) also demonstrate that language proficiency can occur simultaneously on a much larger scale. Focusing on four underachieving school districts in the south, Li and Peters conducted a ten-month survey in which a professional development program crated a workshop for teachers while simultaneously allowing them to put their learning into practice. Their primary focus was to elevate second language (L2) test scores, but administrators understood that teachers needed training in order to “integrate language and content instruction,” maintain respect for ELL’s native language and customs, and “understand how language and culture affect students’

classroom participation” (p. 5). For these school districts, the situation was especially urgent, given that the student test scores were very low and the number of ELL students was rising; from 2007 to 2014, the ELL population increased by 456% (Li and Peters, 2016, p. 6). Li and Peters do not describe the professional development program, but they do record its success in the classroom. At the end of the ten-month study, among ELL students, listening scores increased by 37.2%, language scores increased 29.6%, reading skills increased 28.3%, and writing skills increased by 23.5% (Li and Peters, 2016, 17). Similarly, among K-12 teachers, many expressed confidence and could demonstrate skill sets, taking into account ELL needs. Many also understood and appreciated L2 acquisitions theories, such as Basic International Personal Communications Skills (BICS) and Cognitive Academic Language Proficiency (CALPS), which empower teachers to understand the ways cultural practices impact learning and the classroom environment.

Limitations to Professional Development Programs

Despite some improved performances from ELL students in studies, many of the studies are limited. Almost all of the authors note their field work is an isolated moment in time and geography. The improvements from one year may not be sustained as time progresses. This is due to many factors, including changes in the infrastructure in school the educational system, especially budget cuts and politics. For example, in the TPD program, which elevated ELL students’ interests in math and science, one teacher complained that the test results did not reflect the politics of education: one school was shut down, teachers were transferred, and budget cuts increased the burden on teachers and students alike as science programs were slashed (Johnson, Bolshkova, and Waldron, 2016, p.499). In the case of Li and Peter’s (2016) study, the four school districts carried a massive debt of over \$2.124 million (p. 7). The authors argue that these

political and economic factors, outside their study's control, invariably impact the effectiveness of reform no matter how idealized the program is designed.

Indeed, according to Ross (2014), self-efficacy among mathematic teachers who teach ELL students is decreasing. Ross points to three factors: the number of ELL students has risen and professional development programs have not kept pace, budget cuts to professional development training, and the diversity of ELL students' cultural and native-languages are a daunting obstacle for any native-English speaker to surmount—the latter in reference to the growing immigrant populations besides Latinos (which many studies focus on). Ross conducted an online survey of 400 mathematics instructors in a mid-Atlantic state. Her survey extrapolated the demographics from her group to the teaching force in the United States and found that they matched: most of America's teachers are white, speak one language (native English), middleclass, and female (p. 92). Although these teachers can utilize strategies to build English skills in mathematical contexts, as Chval, Pinnow, and Thomas (2015) demonstrated with Courtney, Ross (2014) argues that many of these teachers do not have “pedagogical training that identifies the cultural awareness methodologies they need to be conscious of when interacting with ELLs” (p.88).

As a result, teacher confidence decreases. According to Ross's (2014) survey, even math teachers with many years of experience feel inadequate when addressing ELL students. This becomes a cyclical process: as ELL students increase in number, self-efficacy decreases as math teachers feel that their past experience has not prepared them for the influx of non-native speakers. In addition to the language barrier, teachers feel that they do not have a shared background, culture, and life experiences. Many teachers have also expressed frustration at the lack of available training opportunities to rectify their decreased self-efficacies. Ross (2014)

points out that budget cuts have slashed the number of professional development courses for ELL instructions. Although there are alternative programs, such as from business and corporate programs, university courses, and the community organizations that offer seminars in cultural immersion, up to forty percent of these professional development programs come from the school district (Ross, 2014, p. 94).

On the other hand, local programs, such as the informal video-sharing “clubs” created by one school and observed by Baecher, Rorimer, and Smith (2016), may seem attractive, but they also have limits. These local initiatives are low-cost, in this case, requiring only a video recorder, and the teachers’ time and interest. However, since they occur in an enclosed school environment, there is a lack of framework to implement wide-scale reform. Instead, these casual observational and feedback sessions involve a close-knit network in which the participants know each other, their students, the community, and share the same administration (i.e. the same principal). As a result, what one group learns will remain largely contained within the same environment. The video-sharing intervention can be exported to other schools and other school districts, but the lessons teachers glean from each other may be more limited in scope.

Even then, the lessons from professional development courses, whether formal or informal, are usually strictly voluntary. In the example of “Janice” from Kibler and Roman (2013), personal views about native-language instruction can resist professional development programs. The online program she undertook itself had a small scope, consisting of online videos and course work with no real on-hand classroom experience. It was only after she left the program and the context of her school environment changed that Janice came to realize the advantage of being able to address students in their first language, and she changed her views

accordingly. As a result, Janice may have come to recognize and implement the policies for ELL, but she did not necessarily agree with them.

Gaps also exist in terms of teachers' self-perception of classroom performance.

According to the study by Lewis, Maerten-Rivera, Adamson, and Lee (2011), teachers' self-reporting on their understanding the goals and implementation policies of reform programs may actually differ in their classroom practices. In their study of one southeastern urban school district, 38 third-grade teachers from fifteen schools underwent training in the National Science Education Standards and immersed themselves in the program's emphasis on fostering English skills within a scientific context. However, the teachers' self-reporting of their understanding of the goals and strategies of the reform program did not correlate with outside observation of their actual practices. The authors suggest that one possibility was that the teachers' perception of science content and practices differed from the actual goals of the reform-oriented practices (p. 162). They recommend that future studies concentrate on instructing teachers on "knowledge and practices co-emerge, as related to understanding" how these practices coincide with the larger goals of reform-programs (p.162).

This gap between teacher practice and the intents behind the reform policies also reflects a criticism against standardized test score. Lewis, Maerten-Rivera, Adamson, and Lee suggest that their outsider observation was inadequate to measure the "true" situations that occurred within classrooms. As a result of this incongruity, the standards they applied and held the teachers up to may have been overly strict. The authors admit they limited their time in the classroom to short intervals and were did not consistently attend classes. Thus, they may have missed the day-to-day interactions between teachers who realize that reform policies might not accurately reflect the actual classroom environment. The incongruities between classroom theory

and actual education practice may also have been shaped by teachers' nervousness and uncertainty in implementing these policies. As Hart and Lee (2003) point out, many teachers may also feel intimidated by the scope of ELL instruction. Many teachers do broaden their understanding of the word "literacy" to mean more than reading and writing. However, at the same time, many instructors felt "less assured" they had the skills and knowledge to execute this larger challenge (Hart and Lee, 2003, p. 493).

In addition, specific tests also had challenges that limited their outcomes. The study by Kim et.al. (2011) on the Pathway Project, for instance, suggests mixed success on CST test scores were due to a variety of factors. ELL students, in general, grow up in homes where English is a minority language and students reaching secondary grade levels (6-12) may require "multiple linguistic resources" before they can tackle challenging texts that CST and CEDLT uses (p.250). In this context, even greater immersion, conducted at an early age, would help these students close the gap before they reach the secondary education stages. In addition, both Pathway and control teachers utilize the same testing criteria to instruct their pupils in order to achieve the higher scores. While Pathway techniques and resources may help ELL students, control teachers tend to use those same strategies in their daily class room settings as well, simply because they lead to higher test results. As a result, Kim et.al (2011) are uncertain if the Pathway Project is a cost-effective program when compared to other reading-writing improvement programs that are designed for slower-learning students, but not specifically for ELL students.

Lee et.al. (2008) briefly mention one other major factor that plays into a child's education. They note that many schools that perform poorly in tests are largely in "urban" areas (Lee et.al. 2008, 61). These studies should reflect that urban environment, and at least point to

the sociological factors that often impact a child's performance, especially one from a presumably immigrant household in which English is a second language. Many students acknowledge that underachieving school are situated in urban contexts, but these studies do not touch upon the sociological background of these children. Given that many of these ELL children come from financially-disadvantaged households (as evidenced by most of the studies noting these child subjects were dependent on school lunch programs), their economic and familial backgrounds surely impacted their ability to learn and to succeed in an unfriendly environment that is far removed from their cultural native homes. These studies would do well to interact within an interdisciplinary field, such as urban studies, in order to create a more complete background to contextualize their studies.

The differences in economic and political backgrounds are tangentially noted in several studies. Unfortunately, a nuanced reading suggests that the teachers themselves can be partly to blame for their lack of engagement with ELLs, although no study states this outright. However, it is clear that some teachers are unwilling to engage with students outside their jobs as educators in classroom settings. This can create disconnect between the students' backgrounds and those of their teachers—which professional development courses are supposed to address. In Kibler's and Roman's (2013) study, they describe Janice's experience with a professional development program and note that the program did not change her mind regarding the integration of native-languages in a classroom setting. Chval, Pinnow, and Thomas (2015) touch upon the dual nature of ELL students. They learn conversational English language on the streets and a more formal language in the classroom (p. 105). However, Chavl, Pinnow, and Thomas (2015) do not venture outside the classroom; they contain their study within the academic setting.

Ross (2014) perhaps gives the most critical reading of teacher reluctance to embrace ELL learners, although she does not concentrate on the point. From her survey, she observes that the over eighty percent of teacher knew that ESL/ELL programs were offered by their school district during the past three years, but over half chose not to take advantage of them (p.95). In addition, of those who did attend, many opted for a one-time seminar, which was judged as the “least effective for changing teachers’ long-term instructional practices, behaviors, and attitudes” (Ross, 2014, p.95). This clinging, or even resistance, to an increasing immigrant population, and ELL students in particular, hints to a latent racism. Indeed, that majority of American school teachers are white and do not speak another language other than English suggests a defensiveness in not wanting to engage in ELL intervention strategies. The study by Li and Peters (2016) also points to the lack of ethnically diverse teachers in the United States as a major contributor to the ELL crisis, which, in turn, points to a larger political and economic issue that may be relevant, but one which none of the authors are unwilling to contend with. It is perhaps outside the scope of their work, but given the topic of education reform does not rest solely upon the educational system, but on environmental factors, family situations as well as community demographics, future studies might integrate their work within a larger socio-economic backdrop.

ELL students and their teachers face many obstacles. In addition to the political and economic backdrop, largely unexplored in these studies, teachers and school districts face the challenge of developing professional programs in the face of budget cuts, while trying to address the many criticisms directed toward standardized testing. Many of the studies affirm the general consensus that ELL student numbers are rising and that professional development courses in English literacy is needed to close the gap between underperforming ELLs and the rest of the

student body. These studies also agree that many of these programs are effective, whether they are large school-sponsored programs, such as Project Pathway or TLC, local video “clubs” to provide feedback and share tips, or Courtney’s individual approach. Many strategies are in place to address the increasing gap between ELL students and the national average, but the studies all agree there remains much more work to be done.



References

- Baecher, L., Rorimer, S., & Smith, L. (2012). Video-mediated teacher collaborative inquiry: Focus on English language learners. *The High School Journal* 95(3), pp. 49-61.
- Carrejo, D.J., & Reinhartz, J. (2014). Teachers fostering the co-development of science literacy and language literacy with English language learners. *Teacher Development* 18(3), pp. 334-348.
- Chval, K.B., Pinnow, R.J. & Thomas, A. (2015). Learning how to focus on language while teaching mathematics to English language learners: A case study of Courtney. *Math Education Resources Journal* 27, pp.103-127.
- Hart, J.E. & Lee, O. (2003). Teacher professional development to improve the science and literacy achievement of English language learners. *Bilingual Research Journal* 27(3), pp. 475-501.
- Johnson, C.C., Bolshkova, V.L.J., & Waldron, T. (2014). When good intentions and reality meet: Large-scale reform of science teaching in urban schools with predominately Latino ELL students. *Urban Education* 5(5), pp. 476-513.
- Kibler, A.K. & Roman, D. (2013). Insights into professional development for teachers of English language learners: A focus on using students' native languages in the classrooms. *Bilingual Research Journal* 36(2), pp. 187-207.
- Kim, J.S., Olson, C.B., Scarcella, R., Kramer, J., Pearons, M. van Dyk, D., Collins, P., & Land, R.E. (2011). A randomized experiment of a cognitive strategies approach to text-based analytical writing for mainstreamed Latino English language learners in grades 6 to 12. *Journal of Research on Educational Effectiveness* 4 pp. 231-263.

Lee, O., Adamson, K., Maerten-Rivera, J.C., & LeRoy, K. (2008). Teachers' perspectives on a professional development intervention to improve science instruction among English language learners. *Journal of Science Teacher Education* 19(1), pp. 41-67.

Lewis, S., Maerten-Riveria, J.K., Adamson K., & Lee, O. (2011). Urban third grade teachers' practices and perceptions in science instruction with English language. *School Science and Mathematics* 1114), 156-163.

Li, N. & Peters, A.W. (2016). Preparing K-12 teachers for ELLs: Improving teachers' L2 knowledge and strategies through innovative professional development. *Urban Education* 0042085916656902. pp.1-18.

Ross, K.E. (2014). Professional development for practicing mathematics teachers: A critical connection to English language learner students in mainstream USA classrooms. *Journal of Mathematics Teacher Education* 17(1), pp.85-100.

