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ENGAGING STEM TEACHERS IN LANGUAGE DEVELOPMENT AND LITERACY PRACTICES FOR ENGLISH LEARNERS

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Engaging STEM Teachers in Language Development and Literacy Practices for English Learners

Synopsis:

This paper discusses the preliminary results of a qualitative study on the integration of language development and literacy practices for ELs in STEM classes taught by in-service teachers participating in the Preparing All Teachers to Better Serve English Learners (PATSEL) Program.

Engaging STEM Teachers in Language Development and Literacy Practices for English Learners

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Abstract

This paper discusses the preliminary results of a qualitative study on the integration of language development and literacy practices for ELs in STEM classes taught by in-service teachers participating in the *Preparing All Teachers to Better Serve English Learners* (PATSEL) Program. Following an exploratory-interpretive approach, the study aimed at identifying changes, both from the perspectives of the teachers' self-analysis and the supervising faculty's observations, that took place in the STEM teachers' instruction as a result of incorporating language development and literacy practices.

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Engaging STEM Teachers in Language Development and Literacy Practices for English Learners

English learners with various linguistic and cultural backgrounds may face challenges in life, language, literacy, and culture in the process of language socialization in a new environment. In school they face ‘double-demands’ of improving their English proficiency and learning how to read and write in English using content knowledge. Moreover, in the context of recent educational reforms (Common Core State Standards), ELs in mainstream classrooms are expected to meet grade-appropriate standards developed for native speakers of English and to demonstrate achievement through standardized tests in English (Harper & de Jong, 2009). However, professional expertise and knowledge of effective content area instruction for ELs remains inaccessible to a majority of mainstream teachers across the United States (Lucas, Villegas, & Freedson-Gonzalez, 2008). In addition, most teacher training programs for subject area teachers do not provide instruction in teaching techniques to use with English learners (Garcia & Gonzalez, 1995; Lee, 2005).

There is mounting empirical evidence that the quality of the teacher is the single most significant school-based factor in determining student achievement. Teachers of ELs need to promote students’ English language and literacy development as well as academic achievement in subject areas. Unfortunately, a majority of teachers working with ELs believe that they are not adequately prepared to meet their students’ learning needs, particularly in academically demanding subjects, such as Science, Technology, Engineering and Mathematics (STEM) (Stoddart et al., 2011). A limited body of research addresses professional development efforts to help in-service teachers enhance their beliefs and practices in integrating Math and Science with literacy for ELs. This research indicates that successful academic preparation of ELs requires subject-specific

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instructional strategies for ELs that go beyond the initial and general preparation in teacher education (Vahey, Lara-Meloy, & Knudsen, 2009; Buxton, Lee, & Santau, 2008).

In response to the pressing need to increase the number of STEM teachers ready to support ELs in their classes, the *Preparing All Teachers to Better Serve English Learners* (PATSEL) Program was created in 2012. Funded by the U.S. Department of Education National Professional Development Grant, the PATSEL Program provides academic preparation and scholarships for in-service STEM teachers to obtain an additional certification in ESL. The program participants are current teachers of STEM subjects in school districts with the largest percentages of ELs in the state of New Jersey. As part of the program, these in-service teachers participate in a 75-hour practicum that involves implementing the use of language development and literacy strategies for ELs in the teaching of a STEM subject. In this paper, in-service STEM teachers are identified as “candidates.”

Following an exploratory-interpretive approach (Grotjahn, 1987), this study looked into the experience of the first cohort of candidates going through the ESL practicum in their own content area classrooms. It aimed at identifying changes in the candidates’ teaching as a result of incorporating language development and literacy practices in their STEM classes both from the perspective of the candidates’ self-analysis and the in-class observations of the supervising faculty.

Context

The PATSEL Program resides at a state university located in an urban area of northern New Jersey. It is designed for in-service teachers in a STEM subject. Candidates teach full-time while they complete their coursework to obtain their ESL certification, thus creating a symbiotic relationship that allows candidates to further their knowledge and skills at the university while putting those into practice in their own classrooms.

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The university has collaborated closely with several of the school districts with the highest concentrations of culturally and linguistically diverse populations in northern New Jersey. Although three of those school districts are partners in the PATSEL Program, any STEM teacher in the state of New Jersey can participate in the grant-funded program. For this reason, the sites where the practicum took place were in both partner districts and non-partner districts. All of these districts are located in the economically disadvantaged areas with increasing numbers of ELs, who represent 25 % and 19 % of the student population in each of the two partner districts, and in the two non-partner districts 6% and 29 % of the total student population.

An important distinction among these school districts is their approaches to teaching ELs. Two of the school districts follow an all-inclusive model that places ELs in general education classes regardless of the level of English language proficiency except for Language Arts (LA). These students receive ESL instruction during the LA periods. The other two school districts also offer ESL instruction in lieu of LA; however, they offer a separate set of content area classes for ELs that shelters instruction until the students exit the ESL program.

While completing the practicum, candidates meet together with the supervising faculty on campus once a week for 75 minutes. In these meetings, candidates are expected to review each other's classroom videotapes and provide feedback, discuss issues related to their teaching experiences, and talk about the components of their portfolio. At the end of the semester, candidates must present a portfolio that includes lesson plans, classroom observations from supervising faculty, a teaching journal with weekly entries, a case study of an EL in their class, and a final reflection on their practicum based on the TESOL P-12 ESL Professional Standards.

Participants

The participants in this study were the first cohort of candidates of the PATSEL Program to go through the practicum. These six candidates, two males and five females, were certified in biology, computer technology, mathematics or science, and had been in their teaching positions for at least two years. Half of the candidates taught in middle school; two of them were science teachers in 7th grade, one was a mathematics teacher in 6th grade. The other three teachers taught mathematics, computer applications, and biology classes in high school. All of the candidates had knowledge and basic experience in the Sheltered Instruction Observation Protocol (SIOP®) Model as they had developed thematic units of sheltered instruction as part of *Content Areas in ESL*, which is one of the required courses to complete the program. Some of them had also participated in a three-day intensive SIOP® workshop as part of the onsite professional development portion of the PATSEL Program.

Methods

The exploration of pedagogical change as it unfolded over the course of the practicum required the flexibility of a qualitative/exploratory study. Using two lenses—the candidates' self-analysis and the supervising faculty observations, it was possible to get a more comprehensive picture of what and how changes occur in the candidates' teaching. A variety of techniques were used to gather data: classroom observations, journals, and videotapes of classes to arrive at "rich, detailed, participant-oriented" representation of the phenomenon under study (Mackey & Gass, 2005, p. 167).

In addition, because the candidates were doing their practicum in their own classrooms, the stakes were higher for them. They were confronted with the responsibility of meeting the district's content pacing charts as well as the key requirement of the practicum: integrating

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language and literacy strategies into their content teaching. This situation led the candidates to problematize the incorporation of language development strategies to facilitate the teaching and learning processes of the content in their classrooms. The candidates' in-depth involvement in the seamless blending of language and content teaching added a 'self-study' dimension, which enhanced the development of grounded theory.

Research Questions

Guiding the inquiry were two questions:

- How do the candidates change their teaching of content to integrate language development and literacy strategies?
- How do the candidates perceive the integration of language development and literacy strategies affects their teaching of content?

Data Collection

Data was gathered in a STEM class that had ELs that the candidates selected out of their teaching schedule in their home schools over the course of a 15-week semester. During this period, the candidates were observed and videotaped, met with the supervising faculty for post-observation discussions, participated in discussions around the issues they faced in their classrooms, made at least one observation of an ESL class, and maintained a journal on their practicum experience.

Each of the candidates was visited three times. The first visit was an informal observation to: a) identify the characteristics of the school, classroom, and students, and b) observe the candidate teaching a content class before using sheltered instruction strategies, and c) observe the dynamics among students and candidate. This information would help establish a baseline from which to compare the candidates' ways of integrating language and literacy strategies.

Subsequently, the candidates had two formal observations for which they had to turn in lesson plans

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using a SIOP® template prior to the observation. To enhance triangulation, each of these formal observations was conducted by two faculty members using SIOP® evaluation forms; one of the observers was the supervising faculty and the other one was a certified SIOP® trainer.

Moreover, the candidates were videotaped twice. Upon completion of each video, the supervising faculty watched the video and selected portions that would be of interest for the cohort to discuss during their weekly meetings. Prior to showing the video, the candidate would provide background information on the class and any details needed to understand the events in the video clip. After sharing the clip with the cohort, the supervising faculty would open up the floor for discussion so that the candidate in the video could receive feedback from their peers as well as to bring their attention to aspects that would clarify or exemplify the use of language development and literacy strategies.

During the 15-weeks of the practicum, the candidates maintained a journal in which they reflected on what they taught, how they felt about the use of language development and literacy strategies, and the students' reactions and progress. They also discussed their observations of ESL teachers either working in their classrooms as push-in support and/or teaching their own ESL classes. In addition, they could reflect on issues of advocacy and parental involvement.

Preliminary Results

To determine the type of pedagogical changes the candidates made to address both the content and language needs of ELs, a careful examination of the data collected is required. Through the use of “an iterative spiral of describing, classifying and connecting” (Richards, 2003, p. 270), it is possible to arrive at a more complete picture of what and how changes occurred. Therefore, the first stage of the data analysis was conducted using grounded theory. A three-tiered approach was applied to examine the data from multiple vantage points. The journals and final reflections

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provided the candidates' viewpoints while the classroom observations and videotapes provided the faculty's viewpoints. Once these two aspects had been analyzed, then a comparison of these two sources of data was carried out to begin making connections. Several themes surfaced in this first round of analysis, ranging from lesson planning to classroom management. The main points are summarized below.

Key characteristics for successful incorporation of language development strategies identified by the candidates:

- Deliberate, purposeful planning for language instruction based on the language needed for content
- Instruction directed and driven by the students' level of English language proficiency
- Multiple ways of modeling language use—written and oral—and practice language (“Teacher does”, “Students do”, “Students do together”, “Each student does on her/his own”)
- Conscientious effort and focus on the students' use of language to provide feedback
- Thoughtful planning of groups for collaborative and interactive activities
- Use of a wide range of visuals—smart boards, pictures, charts, diagrams, videos, and manipulatives
- Balanced focus on all four skills: reading, writing, listening, speaking
- Use of a variety of interactive, hands-on activities that require oral and written language use

Key characteristics for successful incorporation of language development strategies identified by the supervising faculty:

- Language objectives include carefully selected syntactic structures needed to understand and express content knowledge

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- Meaningful use of vocabulary in discourse in addition to word lists/walls with translation
- Systematic, purposeful use of the chalk/white board to provide written reinforcement
- Multiple opportunities for students' oral and written production of language about the content in every class
- Strong classroom management skills for successful differentiation by language level of proficiency
- Limited, purposeful use of first language by teacher and/or peers

Even though the candidates expressed concerns about the difficulties of keeping up with the content pacing chart due to the time spent on language and literacy development, they all found that there was improvement in the academic performance of the ELs at the end of the practicum. Furthermore, most of the candidates indicated that they had gained a better understanding of the linguistic and cultural difficulties that their ELs tend to experience in STEM classes. This awareness has led them to become stronger advocates for ELs and their needs. The candidates also pointed out that they have developed an awareness of the misconceptions that many of the general education teachers have about the role of the ESL teacher. Several candidates expressed their concern about the general education teachers' view of the ESL teacher as 'support personnel' to simply help ELs complete their content-related work rather than as language specialists supporting the English language development of the students.

Conclusion

Although there are no conclusive findings yet, the preliminary results seem to not only support the viability of preparing STEM teachers to incorporate language development and literacy strategies in the teaching content, but also highlight the transformative, enriching experience it can bring about in their professional lives. Further analysis of the data will likely

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provide valuable and detailed insights about the STEM teachers' understanding of language development and literacy practices for English learners as well as their beliefs on effective content area instruction for ELs. In addition, valuable knowledge about the training of in-service STEM teachers on the use of these strategies will be gleaned to make adjustments and improvements to the PATSEL Program.

References

- Buxton, C., Lee, O. & Santau, A. (2008). Promoting science among English language learners: Professional development for today's culturally and linguistically diverse classroom. *Journal of Science Teacher Education*, 19(5), 495-511.
- Harper, C. A. & de Jong, E. J. (2009). English language teacher expertise: the elephant in the room. *Language and Education*, 23(2), 137-151.
- Garcia, E., & Gonzalez, R. (1995). Issues in systemic reform for culturally and linguistically diverse students. *College Record*, 96 (3), 418-431.
- Grotjahn, R. (1987). On the methodological basis of introspective methods. In C. Faerch and G. Kasper (Eds.), *Introspection in Second Language Research*. Clevedon Avon, England: Multilingual Matters.
- Lee, O. (2005). Science education and student diversity: Summary of synthesis and research agenda. *Journal of Education for Students Placed At Risk*, 10(4), 433-440.
- Lucas, T. Villegas, A. M., & Freedson-Gonzalez, M. (2008). Linguistically responsive teacher education: Preparing classroom teachers to teach English language learners, *Journal of Teacher Education*, 59(4), 361-373.
- Mackey, A., & Gass, S. (2005). *Second language research: Methodology and design*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Richards, K. (2003). *Qualitative inquiry in TESOL*. New York: Palgrave Macmillan.
- Stoddart, T., Bravo, M.A., Solis, J.L., Mosqueda, E., & Rodriguez, A. (2011). *Effective science teaching for English language learners (ESTELL): Measuring pre-service teacher practices*. Paper presented to the annual meeting of the American Educational Research Association, New Orleans.
- Vahey, P., Lara-Meloy, T., Knudsen, J. (2009). Meeting the needs of diverse student populations: Findings from the Scaling Up SimCalc project. In Swars, S. L., Stinson, D. W., & Lemons-Smith, S. (Eds.). *Proceedings of the 31st annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Atlanta, GA: Georgia State University. pp. 416-424.