

Linking geography to reading and English language learners' achievement in US elementary and middle school classrooms

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The *GeoLiteracy for English language learners* (ELLs) program is a curriculum that enhances reading and writing skills while teaching geography content for US students in kindergarten through eighth grades. The program includes 85 lesson plans that address all US national geography standards, a quarter of which address environmental issues. The program also includes methodology and materials aimed at meeting the academic needs of the growing population of ELLs in the United States. This article describes a study conducted in three US states that examined the effects of *GeoLiteracy for English Language Learners* on reading comprehension of third to eighth grade students. The findings reveal that reading comprehension achievement of students, especially ELLs, who used GeoLiteracy improved or maintained. Thus, offering geography education to ELLs not only promotes the discipline but also improves reading comprehension. This study uncovered a number of bureaucratic, political and philosophical issues related to the education of ELLs in the state of Arizona, which could mirror issues in other US states.

Keywords: English language learners; geography; integrated curriculum; elementary; reading; comprehension

Rationale and context

This article describes research exploring the effects of a package of geography lessons entitled *GeoLiteracy for English language learners* (ELLs) on reading comprehension of US elementary and middle school students in general and ELLs specifically in the states of Arizona, Oklahoma and Indiana. Our research attempts to understand whether integration of geography content and ELL teaching methods can improve students' reading comprehension in grades three (age 9) through eight (age 14). It is important, however, to contextualize this research in terms of the issues that elementary and middle school teachers in the United States face concerning teaching geography.

In 2001, legislation known as the No Child Left Behind Act (NCLB – No Child Left Behind Act of 2001, 2002) was passed and has dramatically altered public education in the US states that chose to accept the federal dollars associated with the Act (49 out of 50 states did). Those states are required to adhere to policies regarding reporting of student performance in mathematics and reading as measured by standardized assessments. Despite

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the fact that nearly every US state adopted academic content standards in such areas as reading, writing, mathematics, science and geography (Stoltman, 2002), there is ample evidence that NCLB has led to the decline of untested subjects such as geography and other social studies areas in US classrooms, especially in kindergarten through eighth grades (Center on Education Policy, 2006, 2007, 2008; von Zastrow & Janc, 2004). Kerski, Linn and Gindele's (2005) observation for Colorado exemplifies states across the United States, "... because geography is not included in the 'high stakes' tests, it is a subject that is easily lost in the shuffle" (p. 231).

ELLs in America's schools

Students whose primary language is not English have always been a part of the US education landscape (Crawford, 2004; Durán, 2008; Jimenez, Garcia, & Pearson, 1995; Lee & Luykx, 2005; Vaughn et al., 2006). The US Census reports that the percentage of people aged 5 and older who speak a language other than English grew from 17.9% in 2001 to 19.7% in 2006 (US Census Bureau, 2007). Twenty-four states, including California, Arizona, Colorado, Massachusetts and Florida, enacted legislation in the last decade requiring that classroom instruction be overwhelmingly in English (with the exception of foreign language classes).

Schools that serve students in areas with high levels of poverty, where a great deal of ELLs reside, focus their time and resources on literacy and mathematics (Center on Education Policy, 2006), while higher income schools emphasize a richer range of subjects, including social studies (McGuire, 2007). Thus, on the spectrum from applied to theoretical (Lidstone & Stoltman, 2009), the harsh applied reality is that low- to moderate-income elementary students in the United States, particularly ELLs, receive little education about geography.

Although limiting curriculum to literacy and math has negative consequences for all students, ELLs are especially affected since it is through social studies education that students learn geography, civics, history and economics – content which may be unfamiliar or inaccessible because of the lack of background knowledge possessed by ELLs and others who immigrate to the United States (Haynes, 2005; Szpara & Ahmad, 2007). The skills taught in social studies are critical to ELLs' participation as citizens (Jimenez-Silva & Luevanos, 2007a). However, NCLB has also provided US geography education an opportunity to address the systematic minority underrepresentation in geography (Foster & Boehm, 2002) by teaching the ELL segment of this population geography content while still addressing federal and state mandates in reading and writing.

GeoLiteracy

Some educators have responded to this reduction of the curriculum by integrating social studies content into reading and writing instruction. Integration across the curriculum is a theme in international geography education in such areas as citizenship (Van der Schee, 2003), mathematics (Chionh & Fraser, 2009), science (Bednarz, 2009; Mitchell, 2009), core language arts skills such as the identification of casual understanding (Newton & Newton, 2006), cross-curricular in primary education (Greenwood, 2007) and interdisciplinary thinking in general (Kerski, 2005).

One such integrated program is the Arizona GeoLiteracy Program [Arizona Geographic Alliance (AZGA), 2009], a kindergarten through eighth grade curriculum consisting of 85 lesson plans and supplementary materials that reinforces reading and writing skills.

A fourth of the lessons focus on environmental education as well. Teachers who were initially involved in the creation of this program named it GeoLiteracy to indicate that it is a series of lessons that link geography content to literacy (particularly reading and writing) skills. Multistate research revealed significant increases in reading comprehension in most elementary grades from the teaching of GeoLiteracy lessons (Hinde et al., 2007). These findings are consistent with a body of evidence revealing that integrating the curriculum increases student achievement in the tested skill areas of math and reading (D'Agostino, Borman, Hedges, & Wong, 1998; Dorn et al., 2005).

Although there is a body of research concerning curriculum integration, it is important to understand US elementary education thought on curriculum integration, particularly as it relates to social studies (civics, economics, history and geography) and reading at the elementary level.

Issues in integrating elementary social studies

Integrating reading and social studies

Reading researchers have long asserted that content area instruction enhances reading comprehension. Thorndike (Moore, Readence, & Rickelman, 1983; Thorndike, 2005/1917) suggested in 1917 that “perhaps it is in their outside reading of stories and in their study of geography, history, and the like that many school children really learn to read” (Thorndike, 2005/1917, p. 97). Supporting the assertion that reducing social studies, science and the arts hinders reading achievement, Duffy et al. (2003) argue:

If the goal is to improve students' reading achievement, not teaching these subjects will limit students' background knowledge of many topics about which they may read. Because having adequate background knowledge is necessary if one is to comprehend or understand what one is reading, lack of instruction in these subjects may ultimately affect students' reading achievement negatively (p. 685).

Evidence indicates that instruction in the content areas (such as geography) in the elementary curriculum has positive effects on reading achievement in the middle grades (McKenna & Robinson, 2005). Enhancing knowledge of content improves “any subsequent reading and writing germane to that knowledge” (McKenna & Robinson, 2005, p. 168). In addition, when teachers link new information to students' prior knowledge, the topic has more interest to students, which in turn stimulates their interest in reading (Brophy & Alleman, 2002; Doty, Cameron, & Barton, 2003; Good & Brophy, 2000; Irvin, Lunstrum, Lynch-Brown, & Shepard, 1995). Our research, therefore, rests on the premise that linking geography to literacy skills has the potential to stimulate interest in reading and increase reading achievement.

Issues in integrating the curriculum

A variety of arguments have been made that support teaching the curriculum in an integrated fashion as well as teaching in nonintegrated ways (Wraga, 1993). In reviewing debates over subject-centered approaches to teaching versus linking curricula together, Hinde (2005) summarizes:

the bottom line on the research concerning the efficacy of an interdisciplinary approach to curriculum is that when skilled, knowledgeable teachers employ integrated methods, student

achievement is equal to or better than students who are taught in the traditional separate-subject approach (p. 107).

Researchers who examine best practices found that exemplary teachers have ability to integrate the curriculum (Allington & Johnston, 2002; Yeager, 2000). These teachers help students learn to think according to the disciplines as they approach other content areas and do not simply touch on a fact or concept in order to address standards. In one study, researchers found that students of elementary teachers who integrated literacy across the curriculum and did not curtail instruction in the content areas not only reported satisfaction with their teachers but also demonstrated better than average reading achievement on nationally normed standardized achievement tests (Allington & Johnston, 2002).

In order to integrate geography into the curriculum effectively, teachers must have sufficient knowledge of geography and possess the ability to integrate it throughout the curriculum. The goal of integrating the curriculum should be to help students be able to access geographical knowledge and skills to help them make sense of other subjects and of the world outside of school. Integration should help children be able to think spatially and not simply to address standards in multiple curricular areas. Teachers must be wary not to distort or water down the content in the name of integration; they must be cognizant of the developmental appropriateness of their methods; and they must ensure that the content is of rich educational value. If any of the aforementioned aspects are missing in an integrated lesson or unit, then students may learn nothing or may learn incorrect information (Hinde, 2005).

This study focuses on the integrated curriculum, *GeoLiteracy for ELLs*, which teaches geography skills and concepts while reinforcing reading and writing. It also includes enhanced methods that language acquisition specialists suggest using in order to develop and improve English language skills.

The GeoLiteracy for English language learners program

Early in 2000, a seventh grade social studies teacher expressed her concern to the AZGA about the increased pressure to teach reading at the expense of social studies. This worry resonated with teachers from around the country. AZGA coordinators secured a Grosvenor grant from the National Geographic Education Foundation (with support from the Arizona Department of Education and Arizona State University) to develop a curriculum that emphasizes geography and reinforces reading and writing skills for kindergarten through eighth grades. The idea behind GeoLiteracy was to create lessons that enable teachers to teach geographic concepts while satisfying mandates regarding reading and writing instruction.

Teachers, geographers and assessment specialists collaborated to create the lessons that comprise GeoLiteracy. The program consists of 85 lesson plans for kindergarten through eighth grades. Each lesson teaches grade appropriate geography content that links with required language arts content and skills.

Teachers expressed support for the program, and 1293 of them completed surveys expressing their opinions that GeoLiteracy lessons increased students' reading comprehension. With these anecdotal testimonies in mind, Hinde et al. (2007) conducted a multistate 2004–2006 study that examined the effects of GeoLiteracy on reading comprehension in third through eighth graders. The study revealed that students who were taught using the GeoLiteracy lessons achieved statistically significant gains in reading comprehension in most elementary and middle grades, especially seventh and eighth grades, compared with students who were taught without using GeoLiteracy lessons (Hinde et al., 2007).

In response to teacher concerns regarding the growing number of ELLs in US schools, the AZGA was awarded another grant to revise the GeoLiteracy lessons to incorporate methods that are commonly used in teaching ELLs and to study its effects on reading comprehension. The AZGA brought together a team of 23 teachers who were specially certified or had experience in teaching ELLs to revise the original lessons so that they addressed Arizona's ELL standards, national Teaching English to Students of Other Languages standards, as well as remained true to the Arizona and national geography, reading and writing standards as in the original GeoLiteracy program.

The ELL adaptations that the teachers added in creating *GeoLiteracy for ELLs* adhere to the Sheltered Instruction Observation Protocol (SIOP – Echevarria, Vogt, & Short, 2008), a model of instruction used for over 10 years in all US states and in several countries. SIOP incorporates specific content and language objectives as well as key vocabulary that aid the academic achievement and linguistic acquisition process for ELLs. In addition, SIOP features scaffolding techniques and multiple assessments to target needs of ELLs across various proficiency levels.

Assessing ELL achievement is extraordinarily complex (Durán, 1994, 2008; Durán & Szymanski, 1997; Moreno & Duran, 2004) and is a more problematic issue than adapting lessons to meet the needs of ELLs. Several elements of the methodology the teachers employed in creating the curriculum and assessing its effectiveness articulate to key concerns noted in ELL assessment literature. For example, ELLs need models of how to participate in learning activities (Adamson, 1993; Holland & Quinn, 1987). Also, ELL assessments need clearly specified competencies under a specific instructional framework (cf. Durán, 2008), and ELLs benefit from discourse that involves responses to written instructions (Durán & Szymanski, 1997). Each lesson has explicit performance objectives and is taught with a specific set of skill-building tasks under the SIOP framework, with formative assessments (cf. Durán & Szymanski, 1997) embedded within the lessons. The ELL adaptations to GeoLiteracy provide teachers with materials to scaffold instruction and assessments, which aid in providing measures of ELL achievement in reading comprehension. An online virtual workshop exemplifying these strategies and adaptations is a part of the curriculum package (Jimenez-Silva, Hinde, Ekiss, & Dorn, 2010).

Before we describe the methods and findings of the study in more detail, though, it is important to note that we uncovered a number of unexpected political, bureaucratic and philosophical issues related to English learner education in the United States that significantly impacted the administration and analyses of the research. These issues mirror similar observations made elsewhere that ELL status is not well defined (Abedi, 2004). In order to provide a context of the study and because most of the students involved in the study were from Arizona, it is important to relate the issues we encountered before presenting our methods and findings.

Issues in educating English language learners in Arizona

Only English allowed

Arizona has a unique set of circumstances regarding the teaching of ELLs. Being a state that borders Mexico, a significant number of students frequently return to Mexico for holidays and long weekends where they speak little or no English. Then the students return to Arizona classrooms where, since 2000, Arizona law requires that all classes be taught overwhelmingly in English with little to no native language use, with the exception of

foreign language courses. At the time of this study in Arizona, all ELLs were taught in the same classrooms as native and fluent English-speakers.

In order to comply with mandates requiring essentially English-only instruction in classrooms, the Arizona Department of Education requires that all teachers in Arizona complete many hours of state approved Structured English Immersion (SEI) training to obtain or maintain their state teaching certificate. The SEI training required by Arizona includes instruction in techniques that are commonly used in the teaching of ELLs, especially SIOP. The SEI requirement was imposed since teachers can expect to have ELLs in their classroom for part of the school day and because all teachers need to be prepared to support students recently classified as English proficient (Olson & Jimenez-Silva, 2008). As is the case in many other states (Durán, 2008), Arizona students whose primary language spoken at home is not English are required to take an English language proficiency assessment, called the Arizona English Language Learner Assessment (AZELLA). The results of this test determine the classification of students as ELL or English proficient. Schools are eligible to receive extra funding for students who are classified as ELL based on the AZELLA.

Indiana and Oklahoma, the other two states involved in our study, are unlike Arizona in that they generally teach ELLs separate from the main population of students until they attain English proficiency. At the time of the study, those states did not have policies restricting bilingual education, nor did they require all teachers to become specially certified in teaching ELLs as Arizona does.

Identification of ELL students in Arizona

Most of the schools in our study were in Arizona and abided by the English-only law described above. Implementation of this law, though, presented many obstacles for our assessment. For example, many of the 43 Arizona teachers involved in the study were initially unable to identify who among their students were ELLs and who were not. Teachers often did not have easy access to student records and were reluctant to determine students' language proficiency. In a questionnaire distributed to teachers, one teacher noted that she has over 100 students and cannot possibly read each record. A seventh grade teacher indicated that her school's ELL specialist was often unavailable and she did not have easy access to records indicating which students were classified as ELL. As a result, many of the teachers involved in the study did not initially know the language proficiency status of their students.

The tendency for teachers to not identify or misclassify the ELLs in their classrooms had obvious implications for our study, which was designed to examine the effects of an integrated geography curriculum on ELLs. We, therefore, decided to rely on school district records instead of teacher reporting to identify the students. However, we then encountered a number of obstacles in identifying ELLs at the district level.

Through interviews with district personnel and hours spent delving into student records, we discovered that many students who were identified as being ELL had actually not taken the AZELLA. Typically, when a child enrolls in a school, he or she is given a home language survey that helps determine a student's primary language (cf. Durán, 2008). Upon completion, it is the school's responsibility to act on the information provided by the survey and ensure that ELL students' language needs are addressed. However, we discovered considerable variability in schools' responses to the surveys. For instance, district personnel admitted that they were often unaware of which students should be tested and when they should be tested, because they were not always informed of the home language survey results

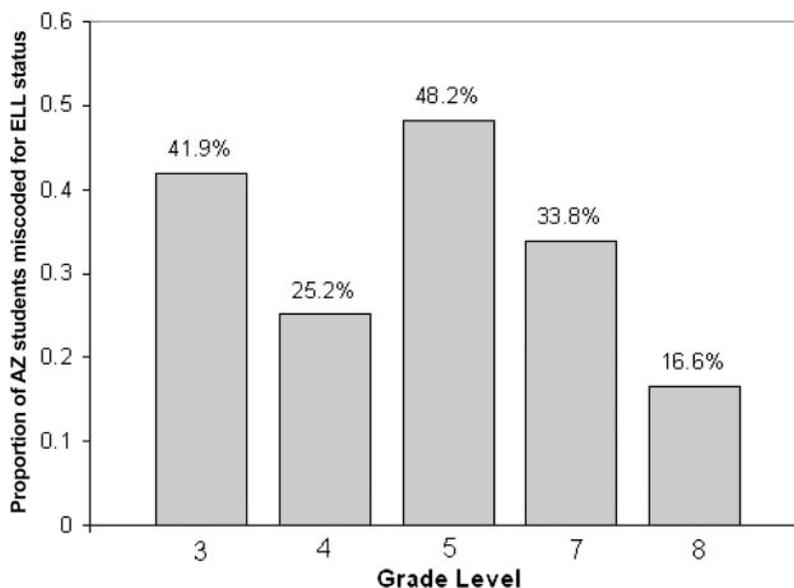


Figure 1. Percentage of Arizona students misclassified as being ELL or not. In Arizona, 327 students (32.4%) were initially miscoded by the teachers and the districts. Less than 5% of Indiana and Oklahoma students were uncoded or miscoded.

of each new student. When schools did notify the appropriate personnel, the AZELLA was often not available to be administered, and in some cases, the district did not follow up for unspecified reasons.

We also discovered that school district records regarding students who were classified as ELL did not always coincide with teacher records. For the purposes of the study, the teachers provided researchers with class rosters of their students, and each student was identified as being ELL or not (to the best of the teacher's knowledge). In addition, each student wrote his or her name on the pretest and posttest. (All names were later removed and translated into numbers to protect anonymity.) In efforts to clarify which students were ELLs, we compared the rosters and names on the tests to the class lists that the districts provided. The lists included student names, grades and schools along with their classification as being ELL or not.

We found that in some cases the district listed students as being placed in certain classrooms, but upon review, we found that district ELL administrators did not know classroom assignments of some students. Teachers often listed students who they thought were ELL, but were nowhere on district ELL lists. Therefore, either the district was unaware of the English proficiency status of some children or the teachers were incorrect in their assumption of some students' English language status. In our study, 32.4% (327 students) of Arizona students were miscoded or uncoded as being ELL, as shown in Figure 1. In Indiana and Oklahoma only a few cases were miscoded or uncoded.

Research methodology

The Arizona State University's Mary Lou Fulton Teachers College, the AZGA, the Oklahoma Alliance for Geographic Education and the Indiana University's Center for Social

Table 1. Counts and percentages of ELL and non-ELL students by grade level.

Grade	ELL	Non-ELL
3	80 (36%)	143 (64%)
4	87 (39%)	136 (61%)
5	76 (32%)	161 (68%)
7	118 (30%)	269 (70%)
8	101 (28%)	260 (72%)

Studies and International Education collaborated in this study to determine the effects of *GeoLiteracy for ELLs* on reading comprehension during the 2006–2007 school year. This study of *GeoLiteracy for ELLs* focuses on the assessment of ELLs' reading comprehension when teachers used the *GeoLiteracy for ELLs* lessons. Our research attempts to answer the question, "what effect, if any, does the integration of social studies, ELL teaching methods, and language arts as presented in the *GeoLiteracy for ELLs* program have on reading comprehension in elementary and middle school students?"

Study design overview

Teachers who taught significant populations of ELL students from each of the three states were asked to volunteer to participate as either an intervention teacher or a comparison teacher. Intervention teachers taught three to five *GeoLiteracy for ELLs* lessons to their students. Comparison teachers did not teach the *GeoLiteracy for ELLs* curriculum. Both sets of teachers administered the same reading pretests and posttests to their students. Comparison teachers taught at either the same school as intervention teachers or from schools of similar socioeconomic status and ethnic demographics as intervention teachers. In all, an intervention group of 35 teachers taught three to five lessons over a 3–5-month period (Arizona and Oklahoma teachers participated in a 5-month period, while Indiana teachers participated in a 3-month period), and a comparison group of 40 teachers concurrently taught their regular curriculum without *GeoLiteracy for ELLs* lessons.

The intervention teachers reported that each lesson required two to three class periods, occasionally more if the teacher contributed additional materials and activities. In addition to the time spent teaching the lessons, both intervention and comparison teachers administered reading pretests and posttests, which were based on the instruments employed in the first study of *GeoLiteracy* (Hinde et al., 2007). The pretests and posttests were administered at the same times in both the intervention and comparison classrooms. The authors, with assistance from reading expert and initial study coauthor Carl Smith, created the assessments (Hinde et al., 2007). The assessments were piloted in the spring of 2006 and then revised as needed prior to administration of the study.

We targeted grades three through eight, since it is in these grades that students are required to take mandated reading assessments in many states. Few sixth grade teachers volunteered to participate, so we were unable to collect enough data from that grade that would allow us to draw valid conclusions. Therefore, we evaluated grades three to five and seven to eight. The number of students within each grade ranged from 223 to 387 (total $N = 1431$). Between 28% and 39% of students were classified as ELLs. Table 1 displays counts and percentages of ELL and non-ELL students by grade level. We were unable to ascertain gender for each student and exact age, however the students' grade levels were reported. There were 23 schools involved in the study, 22 of which qualified for US federal

funds known as Title I funds. (To be eligible for Title I funds, 33% or more of the students in a school come from homes where parent income is so low that the family is in need of federal financial support and the students receive free or reduced lunch prices at school.) All of the schools were located in urban or suburban settings.

All teachers who participated in the study completed a questionnaire in which they reported their years of teaching experience, gender, educational background (college degrees) and age. From these questionnaires, we ascertained that the teachers who participated, both intervention and comparison, were predominately female (81%) and had been teaching from 1 to 34 years (average years experience for intervention teachers was 10.4 and for comparison teachers was 11.8). All teachers earned at least a Bachelor's Degree, and 46% of the intervention teachers earned a Master's Degree, while 41% of the comparison teachers had a Master's Degree. None of the teachers earned a degree higher than Master's. The intervention teachers also reported on their specific practices in teaching the lessons and were invited to comment on the *GeoLiteracy for ELLs* lessons.

As mentioned previously, the teachers were asked to teach three to five *GeoLiteracy for ELLs* lessons during the course of the study. Most teachers taught one lesson approximately every other week during the span of the study. However, there was variability in the amount of days the teachers spent teaching each lesson (i.e. teachers taught some lessons in one class period, while others required two or three class periods). The comparison teachers taught their regular curriculum as they usually did with no intervention or contact with the researchers or *GeoLiteracy* materials.

Although there were a limited number of lessons from which teachers could select (6 lessons for grade three, 10 lessons for grades four and five and 13 lessons for six–eight), teachers of grades three through five preferred lessons emphasizing reading or language skills that aligned with their reading curriculum. Teachers of grades seven and eight, on the other hand, preferred lessons that corresponded with the content that they were teaching in their English or social studies classes. If there was no *GeoLiteracy* lesson that directly corresponded, the teachers selected lessons that were of interest to them personally. For instance, an eighth grade social studies teacher taught a lesson concerning Jerusalem because, as she recorded:

I have been to Jerusalem and was able to use personal photos and experiences to supplement the lesson. We compared this conflict to the conflict we read in 'Mission Possible' [another *GeoLiteracy* lesson]. My students were very interested in this lesson and had a lot of questions. I have been to Ben Yehuda St. and had pictures. Days after I was there, there was an explosion by a suicide bomber. We discussed in depth the issue. I also pulled additional current events articles on this one.

This teacher indicated that she spent two days teaching the actual lesson, but subsequent discussions continued for many days. The fact that this particular teacher chose the Jerusalem lesson because it had special meaning for her exemplifies the flexibility the teachers often used in selecting and teaching the lessons. Admittedly, we had no control over how the lessons were taught and what, if any, additional resources the teachers used to enhance the lessons. Teacher flexibility and creativity in teaching is one of the features of the *GeoLiteracy* program, however.

All of the lessons involved in this study emphasized reading skills of cause and effect, summarizing, main idea, sequencing, drawing conclusions/inferences, following directions and reading/interpreting graphic displays. The geographic content and writing skills differed from lesson to lesson. The assessments for this research targeted only the reading skills

listed above and not geographic content and writing skills. Therefore, regardless of the lessons taught, all choices emphasized the same tested reading skills.

The test instrument

For this study we used parallel test forms, where two equated forms, A and B, were administered after piloting in spring 2006. We developed a different reading test for each of the grades. Form A tests were the same tests that were used during the first GeoLiteracy study for each grade (Hinde et al., 2007), with minor revisions. Form B tests were based on the same reading stimulus for each grade level and were developed to meet the same test specifications, essentially mirroring the questions used in the Form A tests. Fifty-seven percent of students took Form A as a pretest and Form B as a posttest; 43% took B, then A. Coefficient alpha estimates of internal consistency reliability, computed on posttest responses for all grades, ranged from .56 to .72 for Form A and from .54 to .78 for Form B. Reliability estimates computed for ELL student responses were comparable, ranging from .52 to .74 on both forms in all grades. The moderately low reliability estimates are likely due to the low number of items (10) on each assessment. Linear equating, employing a random-groups counterbalanced design (Kolen & Brennan, 1995), was conducted to account for slight differences in difficulty between forms for each grade and to ensure that the means and standard deviations of both forms were comparable within each grade. We also compared student performance on the GeoLiteracy reading test with some students' performance on Arizona's mandated standardized reading test. Correlations between posttest scores and the Arizona reading scores for students from the largest Arizona district ($N = 703$) were moderately high for each grade studied ($r = .67, .51, .65, .62$ and $.50$, respectively, for grades 3, 4, 5, 7 and 8).

Each GeoLiteracy test consisted of 10 selected-response items that measure reading comprehension. Formatted to look very similar to standardized tests of reading that are required for NCLB, GeoLiteracy tests required students to read a passage three to eleven paragraphs in length (depending on grade level) and respond to 10 related selected-response questions. The lesson assessments examined targeted reading skills of cause/effect, sequencing, main idea, summarizing, drawing conclusions/inferences, following directions and reading/interpreting graphic displays. These skills were purposefully emphasized in the development of the GeoLiteracy lessons since they align with all state standards in reading and are thus included in mandated assessments.

It is important to note that the tests did not assess student knowledge of geography content. They were designed to assess student knowledge of selected reading skills that the GeoLiteracy lessons reinforce. The passages that students read on the tests were unrelated to the geography content of the GeoLiteracy lessons targeted for the study; only the reading skills that the lessons reinforced were tested. That is, the instruction provided in the *GeoLiteracy for ELLs* lessons reinforced the reading skills that were tested, but the actual reading passages on the tests were unrelated to the content of the lessons. Although geographic knowledge was not assessed on the tests used for this study, each lesson includes formative assessments of geographic knowledge that teachers use to track student achievement in geography.

Pretest sample characteristics and descriptive statistics of pretest and posttest achievement were examined for each group of students in grades three to five and seven to eight. A three-way mixed factorial analysis of variance (ANOVA) was conducted at each grade level to investigate the effects of GeoLiteracy instruction and ELL status with respect to pretest and posttest achievement. The $2 \times 2 \times 2$ design consisted of two levels of the

between-group factor GeoLiteracy (i.e. GeoLiteracy lessons intervention group or regular curriculum comparison group), two levels of the between-group factor ELL status (i.e. ELL and non-ELL) and two levels of the within-group factor reading achievement (i.e. pretest and posttest measures). Results were examined for GeoLiteracy and ELL main effects as well as any interaction between the use of Geoliteracy and ELL status. A significant main effect for ELL status, with non-ELL students performing significantly higher than ELL students on pretest and posttest measures, was expected. An interaction between GeoLiteracy instruction and the within-group reading measure (pretest and posttest) was anticipated, particularly for the higher grade levels, based on previous results from the first study of GeoLiteracy (Hinde et al., 2007), with students exposed to GeoLiteracy expected to perform higher on the posttest measure compared with the comparison group-taught students. An interaction between GeoLiteracy and ELL status was also anticipated, based on anecdotal reports from the first study. An alpha level of .05 was employed for all statistical tests.

Results

Integration of geography with reading and writing for all students who were taught GeoLiteracy lessons was associated with significantly higher measures of reading performance in grades five and eight. An interaction effect between GeoLiteracy group and ELL status also indicated that GeoLiteracy was associated with significantly higher performance for ELL students in grade eight. No significant differences were found in grades three, four or seven, however achievement of students in those grades still increased from pretest to posttest, with ELLs achieving greater gains than non-ELLs.

Means and standard deviations on the pretest and posttest for GeoLiteracy group and ELL status group are provided in Table 2. In general, posttest means are higher than pretest means, although grade seven posttest means were somewhat lower at all levels of the between-subjects factors. Pretest data was analyzed to identify any systematic, preexisting differences between groups. Independent samples *t*-tests were conducted to assess the presence of any systematic group-related differences in pretest reading performance between students receiving GeoLiteracy-enhanced instruction and those not exposed to GeoLiteracy. No significant difference was found between GeoLiteracy groups on pretest performance for any grade level. No significant pretest differences related to state (Arizona, Indiana and Oklahoma) were found for any grade. Students differed significantly on pretest performance depending on ELL status, with ELL students scoring consistently lower in all grade levels.

A mixed factorial ANOVA assessed the effect of GeoLiteracy instruction and possible interaction effects with student ELL status. The interaction between reading performance measures (Pre–Post) and GeoLiteracy group and the interaction among all three factors were the within-subjects interaction effects of most interest for each grade level. Details from the ANOVA at all grade levels are provided in Table 3.

The within-subjects interaction effect between GeoLiteracy group and Pre–Post was significant for grades five and eight, with students receiving GeoLiteracy-enhanced instruction performing significantly higher on posttest measures of reading achievement. The within-subjects interaction effect between ELL status and Pre–Post was significant for grades three and eight, with ELL students making higher gains from pretest to posttest. The three-way interaction effect among Pre–Post, GeoLiteracy group and ELL status was not significant at any grade level. However, for grade eight, the between-subjects interaction effect for GeoLiteracy group and ELL status was significant, ($F(1, 357) = 9.17, p < .01$). The effect of GeoLiteracy in grade eight was influenced by the difference for ELLs

Table 2. Means and standard deviations of student performance on the pretest and posttest.

Grade	Group ^a	n	Pretest			Posttest				
			Mean (SD)	ELL status	n	Mean (SD)	ELL status	Mean (SD)		
3	GeoLiteracy	93	4.32 (2.29)	ELL	42	3.21 (1.90)	ELL	4.49 (2.69)	ELL	3.64 (2.32)
	Comparison	130	4.75 (2.02)	Non-ELL	51	5.23 (2.19)	Non-ELL	4.78 (2.24)	Non-ELL	5.19 (2.85)
4	GeoLiteracy	154	3.58 (1.71)	ELL	92	3.35 (1.58)	ELL	4.39 (2.08)	ELL	4.07 (2.52)
				Non-ELL	61	5.33 (1.89)	Non-ELL	5.07 (2.05)		
	Comparison	69	3.07 (1.96)	ELL	93	3.05 (1.60)	ELL	4.99 (1.93)	ELL	3.49 (1.99)
				Non-ELL	26	3.92 (1.69)	Non-ELL	4.72 (1.79)		
5	GeoLiteracy	101	5.20 (2.37)	ELL	26	2.45 (1.85)	ELL	4.07 (1.72)	ELL	3.72 (1.79)
				Non-ELL	43	3.44 (1.95)	Non-ELL	4.29 (1.66)		
	Comparison	133	5.30 (2.16)	ELL	26	3.30 (1.65)	ELL	5.90 (2.69)	ELL	4.28 (2.61)
				Non-ELL	75	5.86 (2.23)	Non-ELL	6.46 (2.50)		
7	GeoLiteracy	136	5.36 (2.24)	ELL	47	4.45 (1.63)	ELL	5.14 (2.27)	ELL	3.94 (1.78)
				Non-ELL	86	5.77 (2.28)	Non-ELL	5.80 (2.25)		
	Comparison	251	5.79 (2.46)	ELL	67	4.61 (2.17)	ELL	4.97 (2.29)	ELL	4.34 (1.96)
				Non-ELL	69	6.09 (2.08)	Non-ELL	5.58 (2.43)		
8	GeoLiteracy	186	5.11 (2.25)	ELL	51	4.53 (2.27)	ELL	5.51 (2.48)	ELL	4.10 (2.12)
				Non-ELL	200	6.11 (2.40)	Non-ELL	5.87 (2.44)		
	Comparison	175	5.06 (2.43)	ELL	55	4.19 (2.15)	ELL	5.30 (2.09)	ELL	5.17 (2.18)
				Non-ELL	131	5.50 (2.18)	Non-ELL	5.36 (2.06)		
Comparison	175	5.06 (2.43)	ELL	46	3.46 (1.99)	ELL	4.84 (2.34)	ELL	3.44 (2.12)	
			Non-ELL	129	5.64 (2.31)	Non-ELL	5.34 (2.22)			

Note: SD, standard deviation.

^aThe GeoLiteracy group consisted of students who were taught lessons integrating language arts and geography. The comparison group consisted of students from similar contexts that were taught their regular social studies, reading, or English curriculum without GeoLiteracy intervention.

Table 3. Within-subject effects for mixed factorial analysis of variance.

Grade	Group	<i>df</i>	<i>MSE</i>	<i>F</i>	<i>p</i>	η_p^2
3	Pre-Post	1	4.43	1.50	.22	<.01
	Pre-Post × Geo	1	0.04	0.01	.91	<.01
	Pre-Post × ELL	1	13.03	4.40	.04	.02
	Pre-Post × Geo × ELL	1	1.64	0.55	.46	<.01
	Error (Pre-Post)	219	2.96			
4	Pre-Post	1	73.23	30.30	<.01	.12
	Pre-Post × Geo	1	2.04	0.84	.36	<.01
	Pre-Post × ELL	1	0.26	0.11	.74	<.01
	Pre-Post × Geo × ELL	1	6.26	2.59	.11	.01
	Error (Pre-Post)	219	2.42			
5	Pre-Post	1	7.18	2.48	.12	.01
	Pre-Post × Geo	1	25.11	8.67	<.01	.04
	Pre-Post × ELL	1	0.18	0.06	.80	<.01
	Pre-Post × Geo × ELL	1	4.98	1.72	.19	<.01
	Error (Pre-Post)	230	2.90			
7	Pre-Post	1	19.58	7.52	<.01	.02
	Pre-Post × Geo	1	0.11	0.04	.84	<.01
	Pre-Post × ELL	1	0.02	<0.01	.94	<.01
	Pre-Post × Geo × ELL	1	1.64	0.63	.43	<.01
	Error (Pre-Post)	383	2.60			
8	Pre-Post	1	2.46	0.84	.36	<.01
	Pre-Post × Geo	1	11.95	4.08	.04	.01
	Pre-Post × ELL	1	17.63	6.02	.02	.02
	Pre-Post × Geo × ELL	1	6.29	2.15	.14	<.01
	Error (Pre-Post)	357	8.13			

Note: *df*, degree of freedom; *MSE*, Mean square error; Pre-Post, two levels of reading achievement, pretest and posttest; Geo, two levels of GeoLiteracy factor, GeoLiteracy and non-GeoLiteracy; ELL, two levels of ELL status factor, ELL and non-ELL.

in particular, with ELLs making higher gains from pretest to posttest when exposed to GeoLiteracy lessons than when receiving regular instruction.

Between-subjects main effects were not of interest, given that the effects are compared to the average of the pretest and posttest. As anticipated, between-subjects main effects for ELL status were significant at all grade levels. Effect sizes, assessed with partial η^2 values, were small to moderate for GeoLiteracy effects.

Discussion

Our study indicates that the reading achievement of students who were taught using *GeoLiteracy for ELLs* – an integrated curriculum that teaches geography while reinforcing reading skills – either improved significantly or simply did not decline. These findings resonate with reading researchers who have advocated the need for teaching content in order to improve reading comprehension overall (McKenna & Robinson, 2005). In general, the reading achievement of most of the ELL intervention students was higher than students who did not use GeoLiteracy. These results send a clear signal to US school administrators that teaching geography will not result in a decline in reading test scores, where curriculum is properly integrated.

All but one of the schools involved in the study qualified for federal Title I funds, indicating that they are in schools with high percentages of children living in poverty. Since

schools with high percentages of students in poverty are exposed to less social studies than other schools (McGuire, 2007), not only must ELLs overcome language barriers but they are not being taught fundamental aspects of geography, history, civics and economics that make up the content of social studies. In addition, Putney, Green, Dixon, Durán and Yeager (2000) found that young elementary school ELLs may form learner identities through learning social studies. With the reduction of social studies instruction, young ELLs may not be given the same opportunities as non-ELLs to develop into students with clear identities as learners. By not providing access to social studies as part of ELLs' curriculum, we are impeding their social, academic, economic and political success (Chamot, 2009; Jimenez-Silva & Luevanos, 2007b).

Like ELL scholars (cf. Durán, 2008), we found serious issues with testing ELLs. Our study sheds light on a number of bureaucratic issues in Arizona that school district ELL administrators did not always have accurate records or keep track of the progress of the ELL students adequately. We also found that many of the teachers did not report students who were possibly ELLs or they mislabeled some students as being ELL when they were not. It is our hope that the lack of bureaucratic organization we uncovered is temporary since school districts continue to receive clarification of their expectations of revised state laws and policies. However, these difficulties may have broader implications for the interpretation of ELL data in larger-scale assessments (cf. Durán, 2008). In other words, if larger scale assessments assume an accurate categorization of ELL students without digging into teacher and district records, there may be additional errors to consider in such studies.

Study limitations

The US National Reading Panel (National Institute of Child Health and Human Development, 2000) suggests a criterion for reading research that teachers be randomly assigned and selected in evaluating reading program effectiveness, but the panel relaxed this criterion in studies where randomization is not feasible. Therefore, the panel suggested that researchers employ a quasi-experimental design. According to Slavin (2008),

The evidence to date suggests that quasi-experimental studies in which experimental and control groups are well matched, and in which covariates that correlate strongly with pretests (e.g., achievement pretests) are used to adjust outcomes, produce good, if not perfect, estimates of program outcomes, as long as there are no possibilities of selection bias at the individual student level (p. 8).

The teachers who participated in this study were not randomly selected or assigned. However, no significant differences in pretest student performance were found between the intervention and comparison groups.

Another limitation for which we had no control involved teacher expertise and effects. We agree with Sloane (2008) who noted, “[i]t is commonly held that teachers, even when scripted, implement instructional treatments with some degree of variability. In real life, treatments change in their adoption and adaptation by teachers” (p. 42). We expected the intervention teachers to vary the lessons to meet the needs of their students and of their individual pedagogical styles. Therefore, the intervention teachers employed varying methods and materials to present the lessons.

Conclusions

GeoLiteracy for ELLs is a program that embeds best practices in ELL education (Echevarria et al., 2008) throughout lessons that link geography and language arts instruction. Our fundamental finding is that this type of integrated instruction does not reduce reading comprehension and can enhance it. This research adds to the body of evidence that reading comprehension may increase for ELLs in elementary and middle schools who are exposed to content-rich instruction, specifically geography. Thus, districts and schools implementing English-only instruction of reading and writing that avoid academic language acquisition through content-rich instruction could be reducing ELLs' chances for later success in school.

The findings of our study show that reading scores for students who were taught *GeoLiteracy* were either not significantly different or were significantly higher than reading scores for students not taught *GeoLiteracy*. In other words, spending time to teach geography in this integrated form did not negatively affect reading achievement and may have even enhanced it. Not only is there no valid reason for eliminating the teaching of geography in order to spend more time teaching reading skills to ELLs, the evidence indicates that geography should be a core part of learning English.

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