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# JTAR

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## About the Journal

Founded in 2013, the Journal of Teacher Action Research (ISSN: 2332-2233) is a peer-reviewed online journal indexed with EBSCO that seeks practical research that can be implemented in Pre-Kindergarten through Post-Secondary classrooms. The primary function of this journal is to provide classroom teachers and researchers a means for sharing classroom practices.

The journal accepts articles for peer-review that describe classroom practice which positively impacts student learning. We define teacher action research as teachers (at all levels) studying their practice and/or their students' learning in a methodical way in order to inform classroom practice. Articles submitted to the journal should demonstrate an action research focus with intent to improve the author's practice.

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# LANGUAGE MATTERS TO NEWCOMER ELLS: POSITIVE RESULTS VIA A SIMPLE, MODIFIED DUAL LANGUAGE APPROACH TO MATHEMATICS INSTRUCTION

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**Abstract** This article discusses one ESL teacher's efforts to creatively support his students' mathematics learning via a simple, modified dual language approach. The study examined quarterly test data from Hispanic newcomer English Learners (ELLs) enrolled in grades 4 and 5 at the same school—the treatment group received mathematics instruction almost entirely in Spanish while the comparison group was taught in English. Empirical data revealed that the treatment group exhibited higher gains (7%) than the comparison group (<3%). As the ELL population continues to grow, these findings may offer an alternative to those interested in closing academic opportunity/achievement gaps.

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**Keywords:** teacher action research, dual language, English language learners, newcomers, alternative ESL program

## Introduction

Jose` is an ESL teacher at an urban elementary school. Throughout his 25-year teaching and administrative career, he has taught elementary, middle, and adult English Language Learners (ELLs). As a former ELL himself, Jose` is aware of the challenges such students face and he is passionate about working on possible solutions to help build bridges, especially for newcomers.

Like so many others across the country, Jose's school experienced an unprecedented influx of immigrant school-age children from Central American countries such as El Salvador, Guatemala, and Honduras in the last few years—a trend predicted to continue nationally (Chishti & Hipsman, 2016). And, like so many others, Jose's school was not prepared to effectively support these ELLs—who, in most cases, also present gaps in their educational background. Jose` knew of a couple transitional newcomer programs, but his district continued to rely on standard, English-based 'pullout' ESL models only—approaches often

described as expensive, most commonly used, and least effective in closing academic achievement gaps (Short & Boyson, 2012; Thomas & Collier, 2012).

Feeling frustrated, Jose` approached his principal with a simple request. Instead of his 4<sup>th</sup> and 5<sup>th</sup> grade newcomer ELLs sitting through Mathematics class taught in English every day, could he readjust his role a little, take them as a group, and teach them Mathematics content in their first language (Spanish) instead? His goal was to provide access to core curriculum standards without requiring additional funding (except for a set of bilingual mathematics books). His principal agreed but only if Jose` first agreed to try and measure the effectiveness of this simple, modified, one-way dual language approach throughout the year. Would his students experience greater mathematics academic achievement than a similar population of students who did not receive such native language support? And, if so, to what extent would such Hispanic newcomer ELLs improve their mathematics scores in district and state tests as compared to ELLs who received mathematics instruction in English only? Jose` set out to find out.

## Literature Review

Dual-language, which falls under the umbrella of a more general term of bilingual education, can be defined as an instructional model that uses two languages to teach students literacy and content (U.S. Department of Education, 2015; Center for Applied Linguistics, 2022). Two main variations exist within this definition, including (a) One-way dual-language, which refers to one group of native speakers learning academic content in two languages and (b) Two-way dual-language (or two-way immersion), which consists mainly of providing instruction in both a content area and language to students of other languages as well as English-speaking students in the same classroom, using two languages (Christian et al., 2010). Another variation typical in structured dual-language models involves the time students stay in the program. In a typical ‘early-exit’ program (or transitional bilingual education), ELLs can stay for up to three years “with transition to English completed in second or third grade,” and for all their elementary school years in the ‘late-exit’ model (Slavin, et al., 2011, p. 4).

Language acquisition theories were used to ground this research. Krashen’s (1981, 2003) comprehensible input and affective filter as well as Cummins’ (1981) Common Underlying Proficiency (CUP) substantiate the positive effects that exist when students’ first language is used as support for learning content and a second language. Specifically, Krashen (1981) argued that ELLs learn best when instruction (i.e., the input) received in a low-anxiety setting (i.e., low affective filter) is understandable to them. Such a notion stresses the importance of creating (1) a low-anxiety setting within the classroom (e.g., when ELLs are allowed to speak their language, they feel more at home and anxiety is reduced), and (2) accessibility to the new language by slowing down speech and using visuals and cognates or words that are very similar in both languages (e.g., adult-adulto, car-carro, library-libreria). Cummins (1981) went a few steps further, suggesting that ELLs may benefit when they are allowed to develop conceptual knowledge and cognitive skills in their first language—skills that will eventually and successfully transfer to the new language. Several empirical studies

have provided evidence on such a link (Marian, Shook & Schroeder, 2013; Maxwell, 2015; Valentino & Reardon, 2015).

Dual-language approaches are not always viewed favorably. English-only or English immersion (the opposite of dual-language) proponents argue that the more exposed ELLs are to the second language (i.e., English), the more quickly they learn the language and the better they perform (Baker, 1998; Porter, 1996). Several empirical studies do indeed validate this notion, demonstrating that ELLs enrolled in English-only classes outperform ELLs enrolled in dual-language programs in the early grades (Marian et al., 2013). Yet, the fact that the benefits of English-only programs are limited to the early grades, presents a challenge to the efforts of closing academic achievement gaps in the upper grades (Goldenberg, 2008; Rolstad, et al., 2005; Thomas & Collier, 2012).

## Methodology

*Participants.* During the 2017-18 school year, Jose` served a group of 15 newcomer ELL students who met the following criteria:

- (1) were enrolled in U.S. schools for no more than three years;
- (2) scored no higher than 3.5 overall in the latest state-identified English language proficiency test (e.g., ACCESS), indicating beginning-intermediate levels of English proficiency;
- (3) spoke Spanish as their first language;
- (4) were literate in reading and writing in Spanish, but demonstrated clear academic gaps in that language (e.g., reading below-level based on reading assessment in Spanish);
- (5) qualified for reduced and free lunch; and
- (6) were not enrolled in other programs such as Exceptional Education (EC) or Academically Intellectually Gifted (AIG).

Additionally, Jose's ELL students were divided by grade level, helping him to (1) cover content specific to that grade level and (2) keep the groups small. Jose's strategy was implemented yearlong during a one-hour mathematics block where he taught his lessons in Spanish and English was used at a minimum. For extra support, Jose's students continued to receive their regular ESL services focused on English language arts. All of the participants came from Latin American countries. Was Jose` right? Would his students do better? If so, how would he know?

To investigate the effects of his simple, modified dual language approach, Jose` decided to compare assessment results between his students and a group of students who were comparable. More specifically, he reviewed 2017-2018 quarterly mathematics assessment data on his newcomer ELLs who received mathematics instruction almost entirely in Spanish against secondary archival data from the prior three years (2014 through 2017) for cohorts of students at the same Title 1 school, with similar backgrounds, but who had received mathematics instruction in English only. Note that the curriculum was identical for both the treatment and the comparison groups, but the actual pedagogy varied according to teacher

style. Four different instructors taught 4<sup>th</sup> and 5<sup>th</sup> grade mathematics at this school between 2014 and 2018.

Descriptive statistics in Table 1 reveal how the participant population was divided in two groups. The 48 students in the comparison group included three subgroups of ELLs enrolled in grades 4 and 5 during the 2014-2017 school years, while the treatment group (i.e., Jose's 15 students) included those enrolled in the 2017-2018 school year. This table reports the frequency and the percentage of participant characteristics overall, indicating that despite the differences—e.g., a younger comparison group (67% were in grade 4 versus 47% in the treatment group) and more newly-arrived ELLs in the comparison group than the treatment group (29% versus 20%, respectively, with < 1 year in a U.S. school)—in general the distribution was highly consistent between the two groups. Such commonality in the population's characteristics, as well as the fact that all cohorts came from the same school and scored equivalently on initial English proficiency tests, added a level of validity to Jose's study by reducing both the margin of error and the possibility of other external validity threats.

*Table 1. Demographics by Group: Comparison vs. Treatment*

	Comparison Group 2014-2017		Treatment Group 2017-2018	
	n = 48		n = 15	
Descriptor of ELLs	Frequency	Percentages	Frequency	Percentages
Boys	24	50%	7	47%
Girls	24	50%	8	53%
Enrolled in grade 4	32	67%	7	47%
Enrolled in grade 5	16	33%	8	53%
< 1 year in U.S. schools	14	29%	3	20%
Free/Reduced Lunch	48	100%	15	100%
<b>English Proficiency</b>				
ACCESS Score of 1 – 1.5	20	42%	7	47%
ACCESS Score of 1.5 – 2	12	25%	4	27%
ACCESS Score of 2 – 2.5	7	15%	2	13%
ACCESS Score of 2.5 – 3	6	12%	1	7%
ACCESS Score of 3 – 3.5	3	6%	1	7%

Once he established a comparison group, Jose` dug into the data. To track growth, Jose` chose the diagnostic computer adaptive I-Ready test—one of the school's main quarterly benchmarks that assesses students' progress in mathematics by matching the level of difficulty to each students' ability. The first step consisted of calculating I-Ready pretest and posttest mean (i.e., mean average) scale scores in mathematics within each group. Second,

the difference between the pretest to posttest mean scale scores was computed, providing a mean scale score point difference (gain or loss) in a six-month period for each group. Third, to validate mean differences and to evaluate magnitude of treatment effect, standard effect size between means were evaluated by using Cohen's  $d$  test—i.e., the mean difference divided by the standard deviation SD (Gravetter & Wallnau, 2013). An effect size of 0.2 represents a small effect, 0.5 a medium effect, and 0.8 or higher a large effect. The final analysis involved conducting independent  $t$ -tests between groups. To test Jose's hypotheses, a confidence level of 95% was kept on all of these calculations and a resulting  $t$  value at or greater than 0.05 would represent significant difference in the means.

## Results

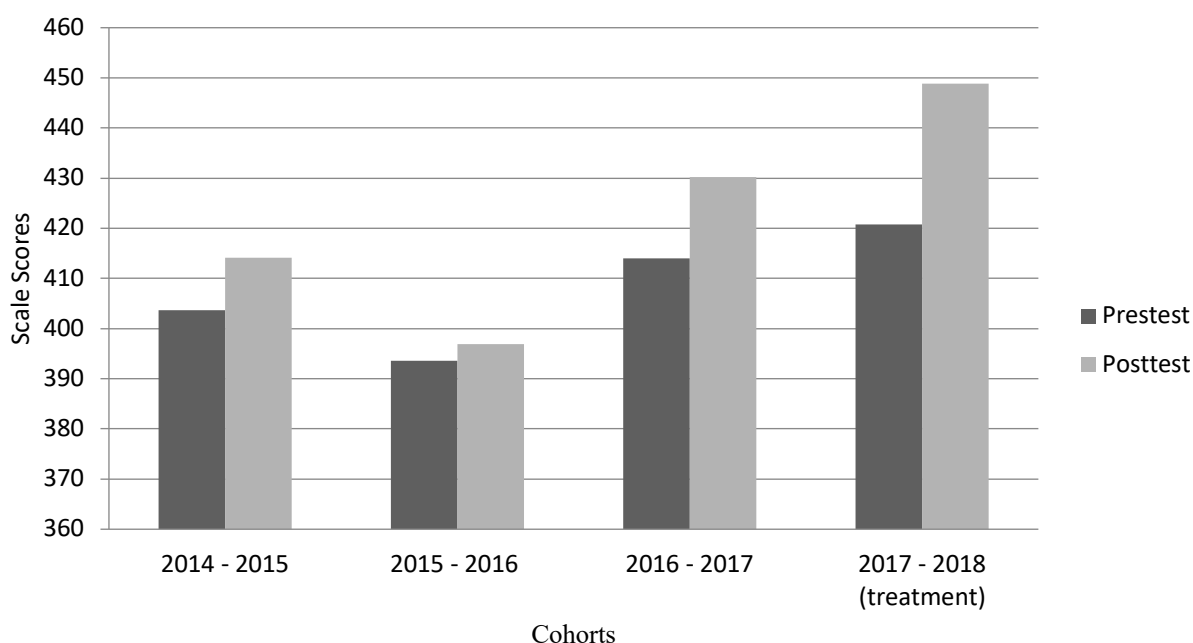
Jose discovered that overall mean scale scores attained by ELLs who received mathematics instruction in their first language (Spanish) were significantly higher than mean scale scores attained by ELLs receiving mathematics instruction in a second language only (English) [Cohen's  $d$  effect of .84,  $t(61) = 3.58$ ,  $p < 0.05$ , effect size large and significant]. Specifically, data indicated that ELLs enrolled in the 2014-2015 school year grew in mathematics competency from a pretest mean scale score of 403.7 points to a posttest mean scale score of 414 points in the September to February period, for a total 10.4-point gain. Similarly, the 2015-2016 cohort started the year with an average scale score of 393.5 and ended with a scale score mean of 396.9, for a total gain of 3.4 points; the 2016-2017 cohort started the year with a mean score of 414 and ended at 430.2, for a total gain of 16.2 points. When averaging the three years of the comparison population, it resulted in 10.4 points of pretest to posttest growth (405.4 to 415.8). While both groups grew in mathematics competency, Jose's treatment group experienced a wider gain, increasing their mathematics achievement from a mean scale score of 420.8 to 448.9 (during the same six-month time frame of September to February) resulting in 28.1 points of pretest to posttest growth as shown in Table 2.

*Table 2. Mathematics Academic Achievement Growth for Students in the Two Groups*

ELL newcomers in grades 4 and 5 receiving mathematics instruction in English n = 48		ELL newcomers in grades 4 and 5 receiving mathematics instruction in Spanish n = 15	
	Mean SD		Mean SD
Pretest - September, 2014	403.7 32.2	Pretest - September, 2017	420.8 31.5
Posttest - February, 2015	414.0 25.7	Posttest - February, 2018	448.9 27.1
Pretest - September, 2015	393.5 41.3		

Posttest –February, 2016	396.9	45. 3
Pretest - September, 2016	414.0	34. 9
Posttest -February, 2017	430.2	22. 8
Pretest - All three years	405.4	36. 8
Posttest - All three years	415.8	34. 6

Jose` was thrilled but he decided to dig a little deeper in an effort to convince his principal. When reviewing the results, data indicated that the comparison group grew at comparable percentage rates across the three years (i.e., 3% in year one; 1% in year two; and 4% in year three). This contrasted the results for his treatment group who experienced pretest to posttest mathematics academic gains of 7% over a similar period of time (see Figure 1).



*Figure 1. Average Pretest—Posttest Gain by Cohort*

### Limitations

Jose` knew that answering the broader question of whether this type of instruction can close achievement gaps for ELLs may require that the time of treatment be expanded to three years or more for optimizing results (Thomas & Collier, 2012). The short period this intervention was given, as well as other limitations such as the small number of ELL participants, use of only one testing instrument, limited number of grades included, multiple

teaching styles, and limited subject areas used may have contributed to the results that Jose` found. Additionally, he wondered ...Was the positive treatment effect attributable to the fact that his ELL students received mathematics instruction in Spanish, or was it due to the cultural congruence of him as the instructor, researcher, and former ELL himself? Jose` reasoned that it might be some combination of both and that he would need to admit that to his principal.

## Conclusion

Language matters to ELLs. Consistent with major research on dual-language, empirical statistical data found in Jose's study demonstrate that ELLs who receive mathematics instruction in Spanish (first language) perform higher than those ELLs receiving mathematics instruction in English only, confirming a positive treatment effect. These findings have valid and important practice implications for elementary schools with similar settings. Arguably, one unique feature of this approach was the simplicity of program implementation as it targeted the population with the greatest academic needs—newcomers. As such, these findings may provide an option for those interested in closing academic achievement gaps for their newcomer ELLs without having to 1) restructure their traditional schools to costly, hard-to-implement dual-language programs, and/or 2) segregate ELLs completely from native English speakers via separate setting Newcomer Centers. Jose's approach presents an easy compromise and a unique contribution to the literature. His results confirm that children with limited English proficiency who are taught using at least some of their native language can strengthen their content knowledge and perform significantly better on standardized tests than similar children (Cummins, 2000).

As research has consistently shown positive correlations in academic achievement and bilingual education (Collier & Thomas, 2020), support for these types of instructional models has predictably increased. However, bilingual teacher shortage, program design, accountability issues, and the like are implementation challenges (Lindholm-Leary, 2012) that may keep some from exploring such programs. The approach examined in this study—grounded on language transfer literature—addresses some of those challenges by (1) reducing the number of teachers needed by narrowing the population served and the subjects taught and (2) lowering implementation costs by reassigning the role of an ESL teacher.

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## About the Authors

**Kathleen M. Brown, Ed.D.** is a Professor of Educational Leadership and Policy at the University of North Carolina at Chapel Hill. She brings 30 years of teaching, administrative, and evaluation research experience to the professorate. As a scholar-practitioner, her research interests include effective, site-based servant leadership that connects theory, practice, and issues of social justice in breaking down walls and building a unified profession of educators

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**Jose` A. Cardoza, Ed.D.** was an English as a Second Language instructor at an urban elementary school in North Carolina. He now serves as Assistant Principal at a large high school in the same district. Throughout his 25-year teaching and administrative career, Jose` has taught elementary, middle, and adult English learners (ELLs), as well as held various leadership roles. As a former English learner himself and now current practitioner, he is aware of challenges ELLs face in public schools. Since he is passionate about working on possible solutions to help these students, Jose`s research interests include bilingual education, social justice, and educational leadership. Jose received his Ed.D. in Educational Leadership from the University of North Carolina at Chapel Hill. Email: armjcar@yahoo.com

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