Teach and Transfer: Evaluating Teacher Candidates' Literacy Lessons for Strategic Instruction

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Abstract

Teacher candidates take a variety of methods classes, but the degree to which they embed those principles in their lessons and effectively develop students' literacy proficiencies remains in question. The purpose of this mixed design research study was to conduct an initial inquiry of emergent data of nine teacher candidates' ninety lesson plans to discover how literacy components were to be taught with strategic methods during field experience.

Keywords: Lesson Plans, Literacy, Teachers

Introduction

Teachers today are tasked with developing skills and using strategic methods to scaffold competent readers who are equipped to navigate, analyze, decipher, and create complex texts. Gone are the days when teachers simply relayed content knowledge to their students; we understand that effective teaching and learning is much more complex (Savage, Burgos, Wood, & Piquette, 2015). Strong teacher preparation programs harness pedagogical expertise for the field (e.g., school partnerships) alongside academic research and theory (American Association for College for Teacher Education, 2010). The International Literacy Association (2010) clearly articulates that teacher candidates must use evidenced based, differentiated, reading and writing pedagogical approaches including print and digital resources. Most states have adopted the Common Core State Standards for English Language Arts that demand authentic, rigorous, and worthy instruction. Of the many standards for reading/literacy listed in the CCSS, particular focus is bestowed on comprehension and text complexity

The CCSS recognized the importance of developing literacy abilities, noting that students "must read widely and deeply from among a broad range of high quality, increasingly challenging literacy and informational texts to be college and career ready" (Fang & Pace, 2013, p. 105). It called for close, attentive, and purposeful reading of disciplinary texts to gain key ideas and details, understand writing craft and structure, and critically evaluate knowledge, claims and evidence. Current recommendations for teaching close reading typically involve selecting quality text: asking more, deeper, and text-dependent questions; and seeking answers to those questions through multiple readings and group discussion (Fang & Pace, 2013).

Effective use of technology is another dimension of successful literacy instruction. Studies have shown that the ways in which teacher candidates are exposed to and taught how to

incorporate technology to facilitate their instruction varies widely (Lee & Lee, 2014). Models are needed by which educators can integrate technology into lesson planning and instruction. Only then can it be determined to what extent teacher candidates are transferring what they learn at their university programs into planning and providing best practices in literacy instruction.

Theoretical Premise

Reflecting on the cognitive-social constructivism instructional base, learning is two-fold in the teacher education field experience including: (1.) In the cognitive modeling process, university professors are guiding teacher candidates with textual content knowledge across subjects encompassing the literacy areas, skills, and methods. Teacher candidates are facilitating their students' learning to comprehend text with background knowledge and make connective interpretations with appropriate tools for example Rosenblatt's "transactional theory of efferent meaning and aesthetic experience developed by reader-responses" (Farris & Werderich, 2011, p. 244); and (2.) In the social constructivism process, teacher candidates and university supervisors are collaborating about content to be taught, connections to content knowledge and strategies to guide their students successfully through social interaction with peers in actively engaged settings. As suggested by Kim (2001), social constructivism is learning through social interactive activities based on students' collaboration and synthesized information for better understanding of meaning. Learning occurs because of constructed strategy.

Review of Literature

Studies of pre-service teachers have highlighted the contradictions between the ideals espoused in their university classes and the realities of their school placements (McCarthey, Woodard, & Kang, 2014). In Grossman, Smagorinsky, and Valencia's (1999) longitudinal study of teacher learning across different settings, they found that both the social contexts for learning (e.g., the culture of the school, the culture of the pre-service program) and individual characteristics of the learner (e.g., knowledge and beliefs about content) affected the tools and interactive provisions used appropriately by teachers across contexts.

Collaboration

A growing body of research shows that collaboration improves students' learning outcomes. When studying qualities of successful schools, Anig (2015) described that a high degree of trust between administrators and teachers was an essential ingredient in making successful schools tick. This sentiment may be generalized to include the trust and collaboration necessary between pre-service teachers and their cooperating teachers. Other factors that came from trust were crucial, including close communication with parents, strong ties with community service providers, effective use of data that identified and responded to problems, and ongoing team-orientated support focused on continually improving teaching practices (Anig, 2015, p. 32).

Lesson Planning

Lesson planning, an ingredient for success, is an intense, deliberate, cooperative process for defining content, materials, and methods that is most likely to lead all students to mastery. Planning produced a detailed road map, charting a path from current levels of understanding to desired levels of mastery (Wiggins & McTighe, 2005). The teachers in high-performing urban schools specified precisely what students would be expected to understand or demonstrate before the lesson ended. "Teachers from Texas posted a three-part objective: (1.) What students would learn; (2.) How they would learn it; and (3.) How they would know they learned it" (Johnson,

Uline, & Perez, 2014, p. 52).

Technology: An important area for both in-service and pre-service teachers to master is the integration of technology into their teaching. Pre-service teachers express more confidence and proficiency in computer use than experienced teachers do (Russell et al., 2003). Integrating technology into classroom instruction can increase student motivation, learning efficiency, curiosity, and creativity (Molins-Ruano, Se, Santini, Haya, Rodriguez & Sacha, 2014). This study sought to determine the extent that teacher candidates' literacy lesson plans include strategic methods for example an evidence of collaborative alignment in literacy instruction as opposed to merely focusing on prescribed content and using technology tools for motivational purposes.

Method

The mixed study adhered to the models of quantitative research design that developed "descriptive exploratory analyses" in a "clinical" experience and led to "inferential" interpretation of literacy instruction (Onwuegbuzie & Combs, 2010, p.400). "Within the case study," the process included simultaneously "collecting data, developing categories, and coding to comparatively analyze the manifest content" (Onwuegbuzie & Combs, 2010, p.405). The emergent data collection expanded beyond initial findings of strategic methods taught. Figures were used to demonstrate the expanded emergent data of Number of Types, Teachers' Use by Grade Levels of Literacy components' categories namely Areas and Skills, Strategic Methods, and Resources for the quantitative calculation process.

Independent Variables

Independent variables were identified as required, structured, non-changing controls inclusive of rules, training, and instructions that form the instructional base of Field Experience. Also, all teacher candidates had passed online modules and assessment of the Teacher Education Technology Competencies (TCA).

Dependent Variables

The dependent variables are the base for spontaneous responses of teacher candidates to responsibilities and instructional application. The individual spontaneous responses were demonstrated in effects of varied instructional abilities, dispositions, and flexibility in selection of literacy components, collaborative relationship development with the classroom students, peers, and cooperating campus teachers, willingness to adapt and modify for different types of learners, and tolerance levels of adhering to new instructions and practices.

Contextual Factors

Settings. The students for each grade level and the total for each classroom include the following: (a) Two kindergartens (38 students); (b) Two first grades (33 students); (c) Three third grades (57 students); (d) One fourth grade (14 students); and (e) One fifth grade (24 students). The school placements were located in rural communities within a 45-minute drive of the Midwest university.

Participants

Data for this study were collected from nine university students (8 female, 1 male) at a state university in the rural, Midwest. Of the nine participants, six were dual majors (double

major of elementary education and special education), and three were elementary education majors. With consideration of the level of their lesson plans and teaching performance, the nine students were categorized 2-4 with 4 being the highest. The teacher candidates were enrolled in the course "Field Work in Elementary Education." This is a supervised practicum, typically during their junior year (one or two semesters prior to their student teaching experience) in which elementary education majors have a teaching experience in an elementary or a middle level classroom.

The teacher candidates were in classrooms for five days per week for a total of twelve weeks during the Spring 2015 semester. They were required to spend at least 2.5 hours a day in a classroom, for a minimum total of 120 hours. The program is organized so that they spend eight weeks in the morning, and four weeks in the afternoon, allowing teacher candidates the opportunity to experience the different facets of the school day.

Each candidate was required to teach a minimal number of required lesson plans consisting of 10 literacy, five math, five social studies, five sciences, and five others that included the integration of subject areas (i.e., literacy and social studies, math and science). Within the ten literacy lessons, comprehension and writing were to be addressed. The cognitive process development structure was adhering to the lesson plan components as follows: (a) Subject Area; (b) Objective; (c) Rationale; (d) Resources; (e) Management Organization; (f) Modeling Procedures; (g) Guided Practice; (h) Checking for Understanding; (i) Student Practice; (j) Closure; (k) Assessment; (l) Academic Language; (m) Accommodations; and (n) Lesson Extensions. The teacher candidates had been trained in writing lesson plans with these same scripted, collaborative components in elementary levels (primary and intermediate) reading courses.

Collaboration

The teacher candidates worked closely in collaboration with their classroom cooperating teacher as well as their university supervisor. They worked with their cooperating teacher in planning and implementing instruction, including curriculum integration of technology, guiding student learning, and evaluating student progress in the elementary school curriculum. When they were not teaching, they were assisting the teacher with classroom responsibilities. The teacher candidates reflected and collaborated with their university supervisor in several ways. The candidates also participated in weekly office meetings that the university supervisor held at the university. During this weekly time, there was discussion regarding their progress, teaching, the required edTPA assignment, and any questions that they might have. The university supervisor observed the teaching of each candidate throughout the semester for at least two lessons. After each teaching observation, a cognitive process-social constructivism conference was held with the university supervisor so that the teacher candidate was able to discuss the outcomes (teaching and applying) of the lesson, student learning, and reflect reflections upon strengths and improvement areas.

Materials and Procedures

The nine teacher candidates submitted their required lessons of 10 each for a total of 90 lessons to the university supervisor for scoring. The lesson plans with confidential numbering were transferred to one of the research authors for the analysis purposes of the paper. The teacher candidates' designated identity number and grade levels were mixed intermittently as well. Individual lesson plans were analyzed using an emergent data selection process that identified

the types of literacy components planned in each grade. Frequency tallies were calculated for each type found in the lesson plan. The next step was to list and categorically arrange the items from emergent data. To prevent duplication, items were organized and numbered, and placed into each category. The purpose was to find out exactly which grades had teacher candidates intensifying instruction with an increased number of types in comprehension and writing even vocabulary.

Following tally marks for components explicitly listed in the lesson plans; SAS software was utilized to calculate frequency distributions, means, and standard deviations; and data were further categorized by grade levels (K, 1, 3, 4, and 5) in an attempt to look for emergent trends. During the emergent data collection by grade levels, a comparison was made showing literacy number of items by categories in Grade 3 with Other Grades. The purpose was to find out exactly which grades had teacher candidates intensifying instruction with an increased number of types in comprehension and writing even vocabulary.

The quantitative data collection of teacher candidates' instructional lesson plans provided a baseline from which to make conclusions and recommendations for teacher candidate lesson planning and pedagogical integration.

Results

Data collection of Number of Types of Literacy Components was calculated with three sections consisting of Total, Frequency of Occurrences, Number of Types, Mean, and Standard Deviation (see Figure 1).

Literacy	Total Frequency of Occurrence	Number of Types	Mean	Standard Deviation
Phonics	34	3	11.33	6.81
Writing	23	4	5.75	6.95
Spelling	7	1	7	NA
Comprehension	228	25	9.04	10.92
Vocabulary	65	5	13	19.99
Syntax/ Grammar	17	1	17	NA
Strategic Methods	**Total Frequency of Occurrences**	**Number of Types**	**Mean**	**Standard Deviation**
Hands-on Active Engagement	42	1	42	4.32
Think/Pair/Share	9	1	9	1.10
Graphic Organizer	17	1	17	0.69
Think/Respond	2	1	2	0
Interactive Dialogue	19	1	19	1.70
Story Map	1	1	1	NA
Resources	**Total Frequency of Occurrence**	**Number of Types**	**Mean**	**Standard Deviation**
Technology Tools	49	1	12.255	6.45
Book Genre	9	1	9	0.49
Skill Book	3	1	3	NA
Graphic Novels	1	1	1	NA
Tall Tale	6	1	6	2.83
Fiction	23	1	23	3.13
Book Parts	1	1	1	NA
Poetry	7	1	7	0.55

Figure 1. Summary of Instructional Planning: Number of Types of Literacy Components.

Data collection of Teacher Use of Literacy Components was calculated with the three sections consisting of Total, Frequency of Occurrence, Number of Teacher Use, Mean, and Standard Deviation (see Figure 2).

Literacy	Total Frequency of Occurrence	# of Teacher Use	Mean	Standard Deviation
Phonics	34	6	5.67	4.18
Writing	23	8	2.88	1.51
Spelling	7	3	1.17	1.15
Comprehension	228	9	38	11.96
Vocabulary	65	9	10.83	2.64
Syntax/ Grammar	17	7	2.83	1.51

Strategic Methods	Total Frequency of Occurrence	Number of Teacher Use	Mean	Standard Deviation
Hands-on Active Engagement	42	7	6	4.32
Think/Pair/Share	9	5	1.8	1.10
Graphic Organizer	15	7	2.14	0.69
Think/Respond	2	2	1	0
Interactive Dialogue	19	7	2.71	1.70
Story Map	1	1	1	NA

Resources	Total Frequency of Occurrence	Number Of Teacher Use	Mean	Standard Deviation
Technology Tools	49	7	7	6.45
Book Genre	9	7	1.29	0.49
Skill Book	3	1	3	NA
Graphic Novels	1	1	1	NA
Tall Tale	6	2	3	2.83
Fiction	23	6	3.83	3.13
Book Parts	1	1	1	NA
Poetry	7	5	1.4	0.55

Figure 2. Summary of Instructional Planning: Number of Teacher's Use of Literacy Components

Discussion

Teacher candidates' lesson plans specified explicit details depicting effective best practices and cognitive process development for the most part. Literacy Areas and Skills were detailed with delineated skills in all areas; Strategic Methods exemplified social constructivism as two general broad areas (Hands-on, active engagement; Interactive Dialogue) with vague descriptions of each types for example these questions for elaboration may be considered: (1.) How were the students specifically engaged? (2.) How were the students interacting with

dialogue (i.e., literature circles, student generated or teacher led questions)? (3.) How were students' or teachers' using the technology? In Teacher Use, two other methods, graphic organizer and interactive dialogue, had more use in lesson planning but were without elaborative specifics. Graphic organizers were generally included, while the literacy focus skill was not specifically identified.

Analyzing types of literacy components designated by grade levels revealed the highest number of occurrences in Literacy Areas and Skills. In the Grade 3 and Other Grades, the analysis sought to find if instruction was intensified in Grade 3 to strengthen the challenges of text difficulty and complexity. Close and in-depth reading in relation to cognitive-social interaction led to conceptual evaluation (Fang & Pace, 2013).

Strategic Methods had higher frequency of occurrences in Hands-on, active engagement; Grade 3 had a high number of graphic organizers but was vague as to type and skill related; Interactive Dialogue was taught across the grade levels with the highest in Grade 3. In Resources, Technology Tools were used across all grade levels and the highest frequencies in Grades K and 5. Fiction was taught in Grades K-4 and was highest in Grade 3. How was Fiction taught with Read aloud, genre type (i.e., Biography), or story elements? These findings in Technology Tools and Fiction confirm that no specificity was evident. Teacher Candidates' diverse instructional use of technology depends on opportunities and taught technology integration (Lee & Less, 2014). In Strategic Methods, Other Grades were higher in Hands-on active engagement and Interactive Dialogue; Grade 3 was slightly higher in Graphic-Organizers, but all other methods and grade levels were comparatively the same. In Resources, Technology Tools had the highest number of frequency and percent; and all other resources had comparatively the same frequency and percent.

Conclusions

The purpose of the research study was to conduct an initial inquiry to find out how teacher candidates planned literacy instruction with strategic methods during field experience. Evidence supported the collaborative instructional structure of specific teams (university and school campus personnel) for guiding teacher candidates to improve student achievement as was suggested by Johnson, Uline, and Perez, 2014. Depicting effective best practice, all of the first literacy section, Literacy Areas/Skills, included subskill delineation that was evident of explicit details.

Most lessons were well planned with two literacy sections lacking descriptive terms: (1.) Strategic Methods, high use (Hands-on, Active Engagement, Interactive Dialogue, and Graphic Organizers); and (2.) Resources, high use (Technology Tools, and Book Genre, mixed). If Graphic Organizers had a few keywords added depicting types of practice and assisting students' retention purposes, and social constructivism development, the lesson plan instruction may have aligned for better objective mastery (Johnson, Uline, & Perez, 2014). If Hands-on, Active Engagement and Technology Tools had been better aligned, clarified and exemplified with specifics details and a few descriptive words in the lesson plans, opportunities to more information may have occurred. Applying the learner's content knowledge and social contextual factors may affect interaction and the selected tool provisions (Grossman, Smagorinsky, & Valencia, 1999).

The results of the study by grade levels and comparison of Grade 3 and Other Grades suggest that instructional planning had been intensified in Grade 3 in comprehension, writing, and vocabulary. The Other Grades need inclusive use of elaborative keywords and may need

specific skills found in strategic methods and resources so that literacy components are clearly understood, consistently aligned, and delivered accordingly. All teacher candidates had been trained and assessed on computer competencies prior to entering the Teacher Education program, but teacher use of technology tools were used three times more in Other Grades than Grade 3. What made this difference in technology tools use? Were the classrooms better equipped with technology or were the grade 3 campus teachers using technology less?

Reflective questions for future study may strengthen written lesson plans and enhance the interactive cognitive-social constructivism that was supported by Kim (2001). Do Teacher Candidates' lesson plans exemplify explicit literacy constructive strategies to better connect content; draw upon students' natural curiosity; and contribute better textual interpretations? Examples of social constructivism are student-generated questioning, problem solving, inquiry, and cooperative sharing among peers. In addition, another question comes to mind about guiding our students for expanding knowledge, social constructive interaction and global cultural appreciation.

In the future, do we set learning goals and guide teacher candidates' lesson plans? We glean from Nunan (2005) the significance of learned information and vocabulary and critical thinking and sharing which will enhance the effects of the future of our students. Our challenge for the future is to rethink lesson planning literacy components and better explain precise cognitive-social constructivism that is presented in brief implied terms in this study's current lesson planning. The results of the study may support and promote lesson planning of teacher candidates' cognitive development of explicit, precise keywords, as was taught in 2 courses by scripting lesson plans, and connecting specific skills that describe strategic methods and resources; thus, teacher candidates implementing the social constructivism process may connect to students' collaborative reading success in evidenced based instructional settings. Teacher candidates and their students learn from a detailed road map, charting a path from current levels of understanding to desired levels of mastery (Wiggins & McTighe, 2005).

Table 1

Summary of Variables in Study

Variables/Levels	Description	Data Obtained From
WSAT math RIT Scores	Mean scores of the Western State Achievement Test	Western State Department of Education
WSAT language arts RIT scores	Mean scores of the Western State Achievement Test	Western State Department of Education
Mean Growth Target scores	Pre-set mean scores that indicate successfully passing the WSAT subscales	Western State Department of Education
7th Grade Level	Students enrolled in the 7th Grade who had math and language achievement test scores	Western State City Middle School
8th Grade Level	Students enrolled in the 8th Grade who had math and language achievement test scores	Western State City Middle School
Bridges Instruction	*Bridges*' online Learning Styles Inventory (LSI) developed by the Bridges Transitions Company	Western State City Middle School
Fast ForWord Instruction	Educational products were developed by Scientific Learning, Inc. designed to promote academic learning	Western State City Middle School
Traditional Instruction	Traditional academic program, delivered through regular class and coursework, exclusive of the specified technological interventions.	Western State City Middle School
Economic Status	Students defined as economically disadvantaged or who were listed as qualifying for free or reduced lunches. Students defined as non-economically disadvantaged were listed as students who did not qualify for free or reduced lunches.	Western State City Middle School
Gender	Male and female students	Western State City Middle School
Ethnicity	Students identified as minority (African-American, Hispanic and Native American.) Students identified as non-minority (students who were not African-American, Hispanic and Native American)	Western State City Middle School

Participants and Data Collection Procedures

Rausch Unit Scale Scores

Students in the school who did not meet the individual mean growth target were identified as at-risk for the purpose of this study and were selected to participate in the *Fast ForWord* and *Bridges* computer assisted interventions. *Mean Growth Target* is defined as the average amount of the Rausch Unit (RIT) growth observed for students in the latest Northwest Evaluation Association (NWEA, 2005) normed study. The RIT scale can be compared, in theory,

to a meter stick which is made up of equal units of measure, for example, centimeters. RIT scores are considered to be reliable and accurate indicators of achievement growth over time.

RIT Scores Are Grade Independent. Since WSAT tests are adaptive and the test items are based on student performance, not age or grade, identical scores across grades mean the same thing. This allows growth to be measured independent of grade level (NWEA, 2005). A primary objective of the research study was to determine the impact of technological interventions on the academic achievement of middle school students.

As a result of their previous performance on state mandated assessments, approximately 100 seventh and eighth grade students who failed to meet the Mean Growth Target on the WSAT RIT language arts and math subscales were identified as at-risk. These students participated in the *Fast ForWord* and *Bridges* technology program.

FastForWord Learning Intervention Program. A group of at-risk students were selected to participate in the *FastForWord* learning intervention program. According to the developers, *Fast ForWord* products are designed to promote academic learning success. Scientific Learning, Inc. (2004) promotes the concept that strengthening these skills results in improved critical language and reading.

Bridges Learning Intervention Program. This research project also included a different group of at-risk students who participated in a second technological intervention called *Bridges*. This program intended to provide assistance to students in the development and improvement of study skills and academic dispositions. *Bridges*' online Learning Styles Inventory (LSI) improves study habits, attitudes and behavior, motivation, and helps students get on a successful academic track (Bridges Transition Company, 2004). The LSI is used in the education community to diagnose middle school students' unique learning styles based on an analysis of their personal preferences.

Traditional Academic Program. A third group of students who met or exceeded the Mean Growth Target scores and were not identified as at-risk students, participated in the traditional academic program as defined by the state standards in math and language arts. The traditional academic program was delivered through regular class and coursework, exclusive of the specified technological interventions. Approximately 400 students participated in the traditional academic program.

Data Analysis

Data were adequately inspected for any missing values with no problems noted. The following assumptions, as recommended by Hair et al. (2005), were checked: linearity of the phenomena measured, constant variance of the error terms, independence of the error terms, collinearity, and normality of the error term distribution. The variance inflation factor (VIF) was examined to ensure correlation models did not exceed a VIF value of 10.

Reported as Pearson's R^2, correlation coefficients were produced using the simultaneous solution multiple linear regression (MLR) analysis procedure. According to Hair et al. (2005), MLR allows researchers to determine a correlation between a dependent variable and the best linear combination of two or more predictor or independent variables. The correlation coefficients indicate the strength of the correlation. An F statistic from an ANOVA tests the significance of the R^2. The threshold for determining significance was set *a priori* at an alpha level of 0.05. Beta weights of the standardized coefficients were examined to determine the unique importance of independent variables in the model.

A priori assumptions of normality and homogeneity for the ANOVA were examined and

satisfied (Hair et al., 2005). An alpha level of 0.05 was set *a priori* for the ANOVA. The MLR analysis, ANOVA, and descriptive statistics were run using the Statistical Package for Social Sciences 12.0® (Norusis, 2003).

Results

Table 2

Descriptive Statistics of RIT Scores by Intervention

Intervention	Subject	Fall 2014			Winter 2015			Spring 2015		
		n	M	SD	n	M	SD	n	M	SD
Bridges	Language	79	212.10	10.88	63	212.46	8.18	61	215.62	8.86
	Math	79	218.87	13.16	63	221.74	11.52	61	225.67	11.09
Fast ForWord	Language	23	213.17	6.96	50	202.90	9.57	51	205.67	10.53
	Math	23	224.52	11.06	50	209.62	12.21	51	215.61	10.40
Traditional	Language	414	220.21	10.57	273	211.99	8.49	379	225.80	10.67
	Math	414	230.23	14.97	273	225.08	11.76	379	239.86	12.42

Even though the traditional instruction groups had higher mean scores than the at-risk Bridges and FastForWord groups in each set of scores, it is noted that small achievement gaps existed between Bridges, FastForWord, and traditional learning groups.

An MLR analysis was conducted to determine which of the computer assisted interventions by grade level accounted for a statistically significant amount of the variation in the dependent variable: WSAT language arts and math subscale test scores for each of the three testing periods. The analysis reported R-squared values of the variation in student achievement in language arts and math on the basis of the predictor variables (see Tables 3 & 4).

RIT Language Arts Subscale Analysis

The ANOVA results at an alpha level of .05 were statistically significant for each of the testing periods. The researchers rejected the null hypothesis due to the fact that predictions on the RIT language arts subscale test scores can be made on a better than chance level when the predictor variables are simultaneously entered into the model. The Pearson's R indicated moderate correlations between the dependent variable and the best linear combination of the predictor variables (see Table 3).

Table 3 shows that the predictors, gender, learning interventions, and economic status were statistically significant predictors of student achievement in the fall testing period. Predictor variables gender, grade level and interventions were statistically significant in the winter 2015

testing period. Gender, grade level, intervention, and economic status were statistically significant in the spring 2005 testing period (Table 3).

Table 3

Summary of Multiple Linear Regression Model Analysis for the Predictors of Student Achievement for RIT Language Arts

	Fall 2014			Winter 2015			Spring 2015		
Predictor variable	**β**	***t***	***p***	**β**	***t***	***p***	**β**	***t***	***p***
Constant		27.37	.000***		23.81	.000***		27.63	000***
Gender	.130	3.17	.002*	.119	2.01	.045*	.122	3.15	.002*
Grade level	.054	1.31	.190	.128	2.19	.029*	.111	2.86	.004*
Intervention	.302	7.31	.000***	.200	3.38	.001**	.434	11.12	.000***
Ethnicity	-0.063	-1.53	.127	-0.019	-0.318	.750	-0.066	-1.70	.091
Economic status	-0.210	-5.06	.000***	-0.106	-1.81	.072	-0.170	-4.36	.000***
R-squared value		.293			.084			.276	
Adjusted *R*-square		.082			.067			.269	

*p<.05, **p<.01, ***p<.001

RIT Math Subscale Analysis

The ANOVA results at an alpha level of .05 were statistically significant for each of the testing periods. The researchers rejected the null hypothesis due to the fact that predictions on the RIT math subscale test scores can be made on a better than chance level when the predictor variables are simultaneously put into the model (see Table 4).

As shown in the Table 4 the predictor variables gender, learning interventions, and economic status were statistically significant predictors of student achievement in the fall testing period. The predictor variables gender, grade level, and interventions were statistically significant in the winter 2015 testing period. Gender, grade level, intervention, and economic status were statistically significant in the spring 2005 testing period (see Table 4).

Table 4

Summary of Multiple Linear Regression Model Analysis for the Predictors of Student Achievement for RIT Math

	Fall 2014			Winter 2015			Spring 2015		
Predictor variable	B	*t*	*p*	β	*t*	*p*	β	*t*	
Constant		17.99	.000***		14.03	.000***		14.03	.0
Gender	-0.084	-2.11	.035*	-0.004	-0.070	.970	-0.128	-0.336	.0
Grade level	-0.084	5.32	.000***	-0.183	.290	.004*	.229	6.02	.0
Intervention	.307	7.62	.000***	.226	3.52	.001***	.439	11.47	.0
Ethnicity	-0.080	-2.01	.045*	.021	.233	.739	-0.054	-0.142	.1
Economic status	-0.214	-5.80	.000***	-0.139	-2.19	.029*	-0.164	-4.30	.0
R-squared value		.194			.103			.305	
Adjusted *R*-square		.186			.083			.298	

*p<.05, **p<.01, ***p<.001

Conclusions and Implications

The conclusion for this study affirmed the key research question. Data indicated that there was an increase in the number of student's meeting growth targets on the state mandated assessment. The overall school-wide student achievement, as measured by WSAT scores, increased by 22% following the first year of implementation of the Fast ForWord and Bridges interventions [reported by the middle school administration]. The academically at-risk students who participated in the technology intervention programs did increase their average academic achievement above the Mean Growth Targets on WSAT language arts and math subscales achievement of the prior year. The overall increase in achievement for the middle school indicated a possible cause and effect of the technology intervention on language arts and math achievement.

Implications for Future Study

A planned future focus of the analysis of data collected in this project will include the effect of gender, socio-economic status, and ethnicity on middle school student language arts and math achievement. The same groups of at-risk students will be included as participants in this analysis. This future study will be conducted to link at-risk student participation in the Bridges and Fast ForWord intervention strategies with language arts and math achievement

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