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The Impact of an Online Transition Curriculum on Secondary Student Reading: A Multilevel Examination

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Abstract

This study investigates the impact of an online transition curriculum embedded with literacy strategies on reading outcomes for secondary students in grades 9–12 across two states. The quasi-experimental pretest/posttest design had a sample of 338 students with and without disabilities and utilized the *AIMS Web Maze Test for 8th Grade Reading Prompts* to measure gain scores in reading comprehension. Multilevel linear modeling methods were used to examine the effects of the curriculum intervention on students nested within teachers. Findings show that while both groups increased in reading, the intervention group made larger gains that were statistically significant and corresponded to a large effect size. These results emphasize the importance of embedding reading comprehension strategies within transition services.

Keywords

transition, college and career readiness, reading, technology, multilevel linear modeling

In the 21st century, literacy skills are more important than ever before. Most jobs require general literacy—word decoding and reading comprehension skills—but these skills are now needed to extract information from websites and digital texts. Many jobs also depend on the ability to communicate and solve problems using technology, skills that are more recently referred to as digital literacy (Coiro, 2012; Izzo, Yurick, Nagaraja, & Novak, 2010). Both types of skills are emphasized in college and career readiness standards like the Common Core (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Adolescents who do not acquire these skills often have low wages and few opportunities for career advancement (Conceição, 2016). Secondary students with disabilities in particular are at risk for these poor outcomes (Izzo et al., 2010; Newman et al., 2011). They fall further and further behind their peers with typical achievement in their literacy skills (Shaywitz et al., 1999; Vaughn et al., 2012) and many end up with low-wage jobs with little evidence that they are able to transition to higher earning careers (National Collaborative on Workforce and Disability for Youth, 2014; Sanford et al., 2011). Poor reading and digital literacy skills, as well as lack of career readiness, are serious risk factors for students with disabilities, and further suggest current secondary special education and transition services may not be adequate for keeping pace with the demands of the knowledge economy in the 21st century simply because general and digital literacy skills are not typically embedded into transition services for students with disabilities.

Prior research shows many adolescents struggle with reading. In 2011, results from the National Assessment of Educational Progress (NAEP), also known as the Nation's Report Card, indicated that more than 65% of all students in Grades 4 and 8 scored below proficient in reading (National Center for Educational Statistics, 2011). Recent data from the U.S. Department of Education, Office of Special Education and Rehabilitative Services (2014) show that the percentage of students with disabilities who were reading proficiently on their state reading assessment dropped each year from third to eighth grade, with a high at third grade of 39.6% to a low in eighth grade of 30.0%. Given that the majority of students with disabilities are not proficient in basic reading skills, they have difficulty comprehending their grade-level text books (Kamil et al., 2008; Lee, Grigg, & Donahue, 2007). Prior research findings also support a

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link between low-reading skills and the risk for school disengagement, unemployment, and low wages (Kutner et al., 2007; McGee, Prior, Williams, Smart, & Sanson, 2002; Vaughn et al., 2015; Wehby, Falk, Barton-Arwood, Lane, & Colley, 2003). Thus, it is important to continue to teach foundational reading skills to students, particularly struggling readers, in high school so they are college and career ready (Izzo & Horne, 2016).

Although the Common Core State Standards (CCSS; CCSS Initiative, 2016) in English Language Arts (ELA) for K-5 students focus on foundational reading skills, such as phonics and reading fluency, the emphasis shifts to higher level comprehension and analytical skills in the content areas with difficult vocabulary and texts by Grade 6 (Montgomery, 2015). For students who are not proficient grade-level readers by the time they reach high school, this shift is difficult and may lead to a potential decline in reading performance in middle and high school (Faggella-Luby, Graner, Deshler, & Drew, 2012; Montgomery, 2015). Content-area literacy cannot fully replace foundational reading skills instruction after the fifth grade, because students need ongoing instruction in general reading strategies throughout their adolescence to become more proficient readers (Faggella-Luby et al., 2012; Montgomery, 2015). As such, it is critical to consider the integration of reading instruction into transition planning content. Transition services are mandated and provide an opportunity to teach embedded literacy in a context that is relevant to their post-school planning for adult life.

Digital or blended learning is increasingly important, as evidenced by the recent prioritization in the Every Student Succeeds Act (ESSA) of 2015, which states digital learning is "any instructional practice that effectively uses technology to strengthen a student's learning experience" (§7112), and subsequently lists tools such as digital learning content, access to online databases, use of data to personalize learning, online and computer-based assessments, and enhanced collaboration between users. The ESSA also defines "blended learning" as "a formal education program that leverages both technology and face-to-face instructional approaches" (§7112). It is critical to ensure students with disabilities are exposed to technology in blended learning environments in general and special education settings to ensure they have equal opportunity to learn technology skills to be prepared for the job market after high school. Unfortunately, literacy-embedded transition curricula are rare. The central premise to literacy-embedded transition curricula is that reading skills are embedded into the transition content, and thus students are able to continue to develop and build reading comprehension while learning key transition skills as they explore careers, build self-determination, set goals, and practice important career development competencies (e.g., create resume, practice interviewing). This intersection of reading and essential transition skills is less prevalent in the secondary special education literature base. Given the more recent emphasis on college and career readiness and the CCSS, as well as the definition of digital and blended learning in ESSA, educators are now faced with the need to address multiple important initiatives simultaneously. Thus, it is imperative that secondary special educators implement curricula that will map onto these multiple initiatives and priorities: college and career readiness, essential transition skills, the CCSS (particularly the ELA and reading standards), and digital and blended learning.

One example of an emerging evidence-based online transition curriculum that maps onto these multiple initiatives is EnvisionIT (Ohio State University Nisonger Center, 2012-2017). EnvisionIT combines digital literacy with elements of essential transition skills, such as career searching and exploration, goal setting, and self-determination; skills that could transfer to preparation for the Individualized Education Programs (IEP) meeting and ultimately to be better prepared for adult life. To date, experimental research has indicated students who received EnvisionIT made significantly greater gains in information technology (IT) literacy than students in a control group, as well as showed greater gains in several transition skills, including goal setting, knowledge of how to find jobs, and information about college (Izzo et al, 2010). In addition, Graham-Day et al. (2016) found that students with disabilities increased their on-task behavior when they used text-to-speech technology to read online through the EnvisionIT curriculum, and Lombardi et al. (in press) found students who received EnvisionIT significantly improved in IT literacy, whereas comparison group students did not significantly improve. However, to date there has not been significant effects of EnvisionIT on reading skills.

Therefore, the purpose of this study was to test the impact of EnvisionIT on reading comprehension skills on secondary students with and without disabilities in a variety of traditional high school settings. The research questions that guided this study were the following:

Research Question 1: What is the effect of EnvisionIT on reading?
Research Question 2: Does this effect differ by grade and by length of class (semester or year)?

Method

Sample

The sample included 18 teachers from 10 secondary schools in two states. Eleven teachers implemented the curriculum (intervention group, n = 223) and seven teachers did not (comparison group, n = 115). The curriculum was implemented in a variety of course types,

including ELA, Career and/or Vocational Education, and Postsecondary Planning. The total sample included secondary students with and without disabilities (n = 338). In the intervention group, approximately 57% of students were on IEPs, 3% were on 504 plans, and 40% did not have a documented disability (with 10% missing data). In the comparison group, 48% of students were on IEPs, 4% on 504 plans, and 48% did not have a documented disability (with 7% missing data). With regard to disability category, both groups had the highest representation of students with learning disabilities (LD), with 27% for the intervention group and 24% for the comparison group. In the intervention group, the next most frequently represented categories were autism spectrum disorder (ASD; 10%), attention-deficit/hyperactivity disorder (ADHD), and chronic health condition (CHC; both 8%), followed by psychological or psychiatric disorder (PPD; 4%) and intellectual disability (ID; <1%). In the comparison group, the next most frequently represented categories were CHC (12%), followed by ASD and PPD (both 4%), and ADHD and ID (both 2%).

The Intervention

The EnvisionIT curriculum engages students in transition assessment and planning activities, while teaching reading and digital literacy skills to efficiently use the Internet to navigate educational, college, and career websites. Students are taught to utilize specific key reading strategies (e.g., concept mapping, skimming and scanning, compare and contrast, summarizing) as they move through 12 curricular units. As students explore career options, they gain instruction on using online databases and identifying effective search terms. EnvisionIT is delivered via an online commercially available course management system, Schoology. Although teacher-directed, EnvisionIT encourages students to self-pace to a certain extent, use technology tools such as Microsoft Office products and Internet browsers to locate and evaluate source material, and is aligned with specific CCSS in ELA.

Teachers use EnvisionIT in blended learning environments to personalize learning so students can connect academic skills to potential postsecondary employment goals. By integrating transition and literacy instruction in a blended learning environment, EnvisionIT addresses several important policy initiatives, including the ESSA (2015), the Workforce Innovation and Opportunity Act of 2014, and the CCSS. Table 1 shows specific curriculum activities that map onto the definitions of digital and blended learning in ESSA (2015). More information is available at http://nisonger.osu.edu/transition/envisionit.htm.

Procedures

Prior to implementing EnvisionIT, intervention teachers participated in 1-day 6-hr professional development (PD) training. During the PD day, teachers were provided with an overview of the curriculum and practiced sample lessons in small groups. They were given some additional time to plan their academic year and consider how the EnvisionIT lessons would be embedded within their existing courses. They were also given the opportunity to set up their courses in Schoology to get acquainted with navigating the platform. Intervention group teachers implemented the curriculum in a variety of high school settings that ranged from core courses (e.g., English/Language Arts) to elective courses (e.g., Career and Technical Education, College and Career Planning, and Postsecondary Planning), with both inclusive (general education) and self-contained settings (special education). Comparison group teachers did not receive any training, did not use EnvisionIT, and carried out business-as-usual transition services that had been designated by the school, district, and state. All data collection procedures and protocols were approved by the Institutional Review Boards to ensure the protection of human subjects.

Measures

AIMS Web Maze Test, Eighth Grade. To test the effectiveness of EnvisionIT, students in both groups were administered a standardized reading measure before and after the intervention, which was the *AIMS Web Maze Test for 8th Grade Reading Prompts* (AIMSweb8; Shinn & Shinn, 2002), a 3-min timed multiple-choice test in which students are given a reading passage and must identify the correct choice of three words to complete sentences in the passage. The total number of items in each passage ranges from 30 to 50. To collect pretest and posttest data, trained members of the research team visited intervention and comparison classrooms. The AIMSweb8 test was group-administered as a paper-based measure. After administration, tests were scored according to the scoring manual and recorded.

Demographic characteristics. School extant data records were used to gather student grade level, free and reduced-price lunch status, and disability status.

Length of class. Students in the intervention group received EnvisionIT either over the course of one semester or one academic year, which was measured with a categorical variable (semester = 1, year = 2).

Data Analysis

Due to the nested structure of the data, multilevel linear modeling (MLM; Snijders & Bosker, 1999) was utilized to fully account for the correlated errors inherent in the data at hand,

Table 1. Alignment of EnvisionIT Curriculum to ESSA.

ESSA 21 U.S.C. 812(c)	EnvisionIT tools and practices
"(3) Digital learning—Refers to any instructional practice that effectively uses technology to strengthen a student's learning experience and encompasses a wide spectrum of tools and practices, including—	
"(A) interactive learning resources, digital learning content [. . .], software, or simulations, that engage students in academic content;	Delivers content via the Schoology Learning Management System or Google Drive that teaches ICT literacy skills to engage students in career research using credible Web sources and databases
"(B) access to online databases and other primary source documents;	Teaches students how to navigate educational, career, and college websites
"(C) the use of data and information to personalize learning and provide targeted supplementary instruction;	Facilitates age-appropriate transition assessments to personalize learning so students explore college and career options aligned with their interest, personality, and learning styles
"(D) online and computer-based assessments;	Students complete online age-appropriate transition assessments, such as the Visual Aural Read/Write Kinesthetic (VARK) Learning Questionnaire, Occupational Information Network (O*NET) Interest Profiler, and unit quizzes
"(E) learning environments that allow for rich collaboration and communication;	Students participate in group discussions, adult support and peer review activities, and blogs to share results of age-appropriate transition assessments and career research
"(F) hybrid or blended learning, which occurs under direct instructor supervision [. . .] through online delivery of instruction with some element of student control [. . .]; and	Students work independently to read content and complete activities and assignments, resulting in a comprehensive Transition Portfolio
"(G) access to online course opportunities for students in rural or remote areas.	Implemented in rural school districts with Internet access; students can access digital curricula at school, home, library—wherever student can access the Internet
"SEC. 4102: Definitions	
"(1) Blended learning—Refers to a formal education program that leverages both technology-based and face-to-face instructional approaches—	
"(A) that include an element of online or digital learning, combined with supervised learning time, and student-led learning, in which the elements are connected to provide an integrated learning experience; and	Teaches students to navigate career based websites based on age-appropriate transition assessments Students work independently on activities after content is delivered by either a teacher or independently by students
"(B) in which students are provided some control over time, path, pace.	Students work independently to read content and complete activities and assignments, resulting in a comprehensive Transition Portfolio

Note. ESSA = Every Student Succeeds Act; ICT = information and communications technology.

where students (Level 1) are nested within teachers (Level 2). In other words, it is assumed that students taught by the same teacher are likely to have more similar responses to each other, relative to those who are taught by another teacher. This analytic approach afforded the opportunity to determine the average correlation among students within a given teacher and, more importantly, ascertains the benefits of EnvisionIT while accurately accounting for the context from which it was delivered.

A difference score, Δaims8, representing change from pre to post responses was calculated for AIMSweb8; Δaims8 was utilized as the dependent variable in all subsequent analyses. To test the assumption of independence required for ordinary least squares (OLS) regression, a random effects analysis of variance (RE-ANOVA) model was estimated so that the intraclass correlation coefficient (ICC; ρ) could be calculated. The ICC represents the proportion of variance found between teachers and corresponds to the degree to which the independence assumption of OLS is violated. The RE-ANOVA can be represented by the following equations:

$$\text{Level 1: } \Delta\text{aims8}_{ij} = \beta_{0j} + e_{ij},$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + u_{0j},$$

where γ_{00} corresponds to the grand mean of Δaims8, and u_{0j} represents teacher j's deviation from γ_{00}. The total variability in Δaims8 between teachers is captured by τ_{00} and provides scaling for its distribution. Therefore, Δaims8 is distributed as $\Delta\text{aims8} \sim (\gamma_{00}, \tau_{00})$ in the population. Below is the equation to calculate an ICC:

Table 2. Descriptive Statistics of Study Outcome by Intervention Status.

	Intervention group				Comparison group			
Variable	*n*	*M*	*SD*	Skew	*n*	*M*	*SD*	Skew
Preintervention								
AIMSweb8	223	23.68	10.42	0.46	115	30.13	11.12	−0.32
Postintervention								
AIMSweb8	210	26.03	11.11	0.61	97	31.18	12.61	0.09

Note. AIMSweb8 = *AIMS Web Maze Test for 8th Grade Reading Prompts*.

$$\rho = \frac{\tau_{00}}{\tau_{00} + \sigma^2},$$

where σ^2 represents the homogeneous variance estimate at Level 1.

To determine the effect of EnvisionIT on reading, Δaims8, an *intercept-as-outcome* model was estimated. To accomplish this, an intervention indicator, measured at the teacher level, is entered into the model as a Level 2 predictor of the intercept variance, τ_{00}. If EnvisionIT has an effect on Δaims8, it would be expected for τ_{00}'s estimate to shrink, due to a significant proportion of its variability being explained by intervention status (TREAT). This model is represented by the following equations:

$$\text{Level 1:} \Delta\text{aims8}_{ij} = \beta_{0j} + e_{ij},$$

$$\text{Level 2:} \beta_{0j} = \gamma_{00} + \gamma_{01}\text{TREAT} + u_{0j},$$

The parameter γ_{01} directly tests whether or not students who received the EnvisionIT curriculum experience a boost in Δaims8, relative to their comparison counterparts.

After establishing the effect EnvisionIT had on Δaims8, a series of models were estimated to investigate how Δaims8 differs across grade levels and class lengths via indicator variables. This was accomplished by including within-level predictors; therefore, these indicators were entered at Level 1, while controlling for free/reduced-price lunch status.

Adequacy of MLM. Unlike structural equation modeling, MLM does not rely on the recovery of the observed covariance matrix. Therefore, there are no global fit indices to rely on within MLM. Instead, pseudo r^2 and chi-square difference tests ($\Delta\chi^2$) were utilized to determine the adequacy of the models introduced above. Pseudo r^2 is interpreted as the proportion of the observed variance explained by the addition of a predictor and its respective random component (e.g., student level, σ^2; teacher level, τ_{00}). Pseudo r^2 for the intervention status is

$$\text{pseudo } r^2 = \frac{\tau_{00.B} - \tau_{00.A}}{\tau_{00.B}},$$

where $\tau_{00.B}$ corresponds to the *baseline* estimate of Δaims8's variability (e.g., RE-ANOVA model) and $\tau_{00.A}$ corresponds to the *alternative* estimate of Δaims8's variability controlling for intervention status (intercept-as-outcomes model). In a similar vein, $\Delta\chi^2$ determines whether or not the change in −2 log likelihood (e.g., Δ−2LL) due to the inclusion of a given predictor (e.g., Δ*df*) was statistically meaningful while remaining parsimonious. If the $\Delta\chi^2$ test is significant, then inclusion of the additional model term is deemed acceptable. Such chi-square tests were appropriate, as estimation was carried out using full information maximum likelihood rather than restricted maximum likelihood. All MLM models were executed with Mplus, version 7.3 (Muthén & Muthén, 2015). Using the resulting parameter estimates (e.g., *t* values), effect sizes, in the form of partial correlation (*pr*) coefficients, were calculated based on Rosenthal and Rubin (2003), where .51, .36, and .14 correspond to large, medium, and small effect sizes, respectively.

Results

Table 2 contains descriptive statistics for AIMSweb8 at both pretest and posttest stratified by group. As shown, both groups made gains in AIMSweb8 scores by the time of posttest, with the intervention group making larger trend-level gains. A more thorough investigation was needed to examine the difference scores across groups, and MLM was thus utilized. It should be noted that disability category was tested as five separate dummy-coded predictors based on the highest categorical representation (LD, ASD, ADHD, PPD, and Other) in preliminary models and did not explain significant variance; thus the disability predictors were removed from the final model. The total number of students at posttest (n = 307) decreased from the total number at pretest (n = 338) due to rates of attrition primarily caused by students who dropped out of the study prior to the posttest (n = 31, or 9% of the sample). The reasons for dropping out of the study included dropping out of school, suspension from school, and chronic absences.

Research Question 1: What Is the Effect of EnvisionIT on Reading?

Test of independent errors. The RE-ANOVA was estimated using complete response data from 297 students, across a total of 17 independent teachers, making the average *n* per cluster 17.5 students. The sample size decreased slightly with the estimation of this model due to some missing data in student responses. This model produced an ICC of 0.129, affording the interpretation that nearly 13% of the variance observed for Δaims8 was between teachers. As such, an ICC of this size clarifies that it would not have been acceptable to use OLS regression. The fixed component of this model, the grand mean, was not significantly different from 0 (γ_{00} = 0.516, *SE* = 0.747, *p* = .490); as was its respective random component, its variance (τ_{00} = 5.69, *SE* = 3.16, *p* = .071). However, it is likely that a Type II error occurred due to the small number of teachers available for the analysis. With regard to the random component at Level 1, it was found to be statistically different from 0 (σ^2 = 38.47, *SE* = 3.24, *p* < .001). The local fit indices produced from this model were −2LL = 1,945.3; Akaike information criterion (AIC) = 1,951.3; and Bayesian information criterion (BIC) = 1,962.3.

Effect of EnvisionIT on reading. Response data from 297 students were utilized to estimate intercepts-as-outcomes. The parameter representing the estimated average change across administration for the comparison group was not found to be significantly different from 0 (γ_{00} = −1.262, *SE* = 1.106, *p* = .254), whereas the parameter representing intervention status—the Level 2 predictor—was found to be significantly different from 0 (γ_{01} = 2.818, *SE* = 1.375, *p* < .05). Therefore, those who received EnvisionIT, on average, experience a gain of 2.82 points more than their comparison counterparts. The predicted change in AIMSweb8 scores between administrations for those who received EnvisionIT is determined via the linear combination of γ_{00} and γ_{01}; arriving at a 1.556 increase in AIMSweb8 from pre- to posttest administrations scores. By controlling for intervention status, τ_{00} from the RE-ANOVA decreased (τ_{00} = 3.857, *SE* = 2.372, *p* = .104); producing a pseudo r^2 of .32, or 32% of the variance is explained by intervention status. In terms of the $\Delta\chi^2$ test, the addition of intervention status was found to be significant at the .10 level. This model resulted in a −2LL of 1,941.49, an AIC of 1,949.5, and a BIC of 1,964.3.

Research Question 2: Does This Effect Differ by Grade and Length of Class?

Effect conditioning on grade and class length. The final model included within-level regression where socioeconomic status via free/reduced-price lunch indicator predictor, class length, and grade-level indicators were entered at Level 1. As a result of listwise deletion due to missingness on student level covariates, this model was estimated using 287 students across 15 teachers, providing on average 18.9 students per teacher. The model is represented by the following combined equation:

$$\Delta\text{aims8}_{ij} = \gamma_{00} + \gamma_{01}\text{TREAT} + \gamma_{10}\text{YRLONG} + \gamma_{20}\text{LUNCH} + \gamma_{30}G.10 + \gamma_{40}G.11 + \gamma_{50}G.12 + u_{0j} + e_{ij},$$

where γ_{00} corresponds to the prediction of Δaims8 for ninth graders who participated in a semester-long intervention, and were not eligible for free/reduced-price lunch. After controlling for the aforementioned covariates, the EnvisionIT effect remained significant (γ_{01} = 3.11, *SE* = 1.31, *p* < .05) and its respective partial correlation coefficient corresponds to a large effect size ($pr_{\gamma 01}$ = .55). With regard to the parameters of the within-level regressions, a significant effect was detected for those in the 11th grade (γ_{40} = 3.88, *SE* = 1.64, *p* < .05) and its effect size was determined to be right at the cutoff for a small effect ($pr_{\gamma 40}$ =.14). The resulting model fit indices were as follows: −2LL = 1,852.2; AIC = 1,870.2; and BIC = 1,903.0. Insertion of the additional five within-level predictors was found to be significant, as the critical value for 5 degrees of freedom is 11.07 [$\chi^2(5, n = 287) = 89.29, p < 0.001$]. See Table 3 for all estimates from the final model, along with their respective partial correlation coefficients as a measure of effect size. As a snapshot of the data modeled in this analysis, Figure 1 shows a graphical representation of the pretest and posttest scores of students who had IEP (*n* = 120) in the sample, thus illustrating the large effect of EnvisionIT on reading particularly for students with disabilities.

Discussion

The purpose of this study was to examine the effect of an online transition curriculum, EnvisionIT, on secondary student reading skills. Specifically, we tested the intervention effect using a quasi-experimental pretest/posttest design and controlled for the duration of delivery (e.g., semester or year-long class), grade level (e.g., 9–12 grade), and student socioeconomic status (e.g., students who qualify for free and reduced-price lunch). Results indicated a significant and large effect of the EnvisionIT intervention on increasing reading comprehension skills for students with and without disabilities. Among students who participated in a semester-long intervention, it was predicted that ninth graders increase 3.11 points, 10th graders increase 4.56 points, 11th graders increase 6.99 points, and 12th graders increase 6.22 points from pretest to posttest on the AIMSweb8 (see Table 3). Through our model-testing process, we entered variables representing the most prevalent disability categories as covariates into the model but did not find significant

Table 3. Effects of EnvisionIT on Eighth Grade AIMS Web MAZE Scores.

	Final model	Effect size
Parameter	Fixed effects	*Pr*
Intercept	−3.40 (1.43)	.55
Level 1 (Student specific)		
Year long	−0.99 (1.96)	.03
Lunch	0.88 (0.83)	.06
10th grade	1.45 (1.76)	.05
11th grade	3.88* (1.64)	.14
12th grade	3.11 (2.19)	.08
Level 2 (Teacher)		
EnvisionIT	3.11* (1.31)	.55
	Random parameters	
Level 2		
Intercept ($\tau 00$)	2.86 (1.86)	.39
Level 1		
Intercept (σ^2)	39.13 (3.36)	.57
−2 log likelihood	1,852.2	

Note. Fixed effects estimates (Top) and variance-covariance estimates (Bottom). $p < .05$.

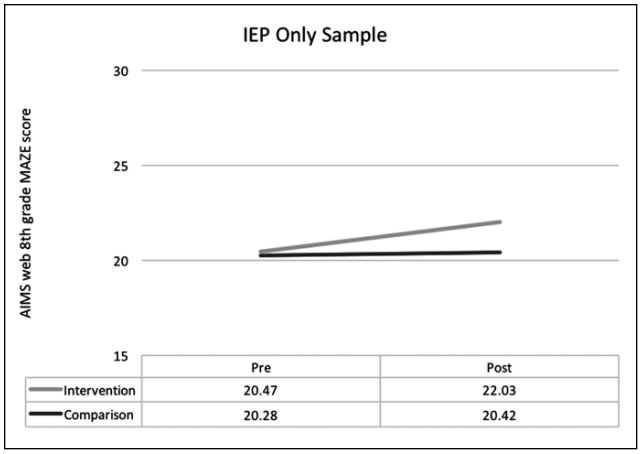

Figure 1. The change in pretest and posttest scores on the AIMSweb eighth grade MAZE for students on IEPs in the intervention and comparison groups.
Note. IEP = Individualized Education Program.

effects. This finding suggests EnvisionIT is effective across a variety of disability types, specifically those most prevalent in this study's sample (LD, ASD, ADHD, PPD). Also, as described in the Procedures section, EnvisionIT was implemented in a variety of high school courses in general and special education settings. These findings suggest that EnvisionIT can have meaningful and positive effects on secondary student reading skills in a variety of contexts, an important result considering more than 80% of secondary special education students spend the majority of their instructional time in general education settings (Wagner, Newman, Cameto, Levine, & Marder, 2003). Furthermore, these results add to the secondary transition literature base by demonstrating the promise of literacy-embedded transition curricula as an evidence-based practice that can be flexibly implemented in a variety of settings.

To date, secondary special education and transition curricula have primarily focused on two areas: (a) specific skill areas related to adult life and (b) preparing for the IEP meeting. Specific skill areas in transition curricula tend to be vocational/career skills, self-determination (Wehmeyer & Palmer, 2003; Wehmeyer, Palmer, Lee, Williams-Diehm, & Shogren, 2011), and social skills (Murray & Doren, 2013). With some curricula, these skills are taught in combination, such as self-determination and vocational skills (Doren, Lombardi, Clark, & Lindstrom, 2013), or social skills and vocational skills (Murray & Doren, 2013). Multiple evidence-based curricula on preparing for and leading one's own IEP meeting are available in the secondary special education literature base as well (Allen, Smith, Test, Flowers, & Wood, 2001; Arndt, Konrad, & Test, 2006; Kelley, Bartholomew, & Test, 2011; Martin et al., 2006). Thus, although the secondary special education literature base is continually expanding, embedding reading into transition services remains a sparse topic. Findings from the current study demonstrate the promise of this approach.

Literacy skills have become increasingly critical in the 21st century due to the growing expectation that the majority of adults will use some technology skills to gain and sustain employment (Partnership for 21st Century Learning, 2015; U.S. Department of Labor, U.S. Bureau of Labor Statistics, Employment Projections Program, 2012). The ESSA (2015) mandates literacy education for all (§6641) and identifies essential characteristics of 21st-century schools intended to assure that all students graduate with the general reading and digital literacy skills needed to be college and career ready. Moreover, literacy skills are addressed in the CCSS in English/Language Arts, particularly with the emphasis of searching and evaluating credibility of online digital sources (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). The findings from this study further support earlier research (e.g., Izzo et al., 2010) and current legislative mandates that emphasize the importance of embedding literacy instruction via age-appropriate and relevant contexts that enhance students' motivation to engage in learning the skills needed to enter the 21st-century workforce.

Limitations and Suggestions for Future Research

Although the results of the current study are promising, there are several limitations to consider in the interpretation of the findings. First, although EnvisionIT was implemented in a

variety of settings that ranged from courses to resource rooms, this variability was not necessarily captured in the multilevel models. In the current study, differences between general education courses, special education courses, and resource rooms were not examined. In future studies, more descriptive categorical variables on the type of classroom might be utilized. Also, teachers taught the curriculum over the course of one semester or year, but the number of units taught by teacher was not included in the data collection efforts. Thus, in future studies, it will be critical to better understand the relationship between the amount of the curriculum taught (e.g., ranging from six to 12 units) and student outcomes. Also, fidelity of implementation was not investigated as part of the current study. Thus, the quality of the instruction and whether or not teachers taught the core lessons was not measured and therefore unexamined. Future studies should include a classroom observation measure that focuses on these areas—quality of instruction and amount of lesson(s) taught—to be measured and included in multilevel models. Finally, the study design was quasi-experimental. Efforts to use random assignment to ensure a true experimental design should be prioritized in future studies.

Implications for Practice

The EnvisionIT curriculum offers general and special educators the opportunity to teach literacy and transition skills to students with and without disabilities in blended learning classrooms as mandated by ESSA. Teachers can screen their students' literacy skills to determine who may need more intensive intervention. Some students are able to work through the curriculum more independently, whereas others will need more explicit and direct instruction to navigate the Internet and complete the activities. By teaching in a blended learning classroom, teachers will have more time to differentiate and provide instruction to students who need more explicit instruction in small groups or individually.

The EnvisionIT curriculum is best taught in collaboration with general and special education teachers, school and vocational rehabilitation counselors, and other professionals who focus on career readiness and exploration. These professionals can help students to gain both reading and digital literacy skills as they complete online transition assessments, discern credible websites, and navigate databases related to their postschool pursuits in employment and postsecondary education. Digital literacy can be embedded into existing courses, which may enhance accessibility for many students with disabilities who use text-to-speech software programs. In universally designed classrooms, any student can choose to use text-to-speech software programs based on individual learning styles and preferences, reducing the stigma for students who are dependent on these reading supports.

Ultimately, reading and digital literacy skills are relevant to a wide range of employment and postsecondary settings, and thus represent essential skills for adult life. Particularly, for students with disabilities, digital literacy has the potential to provide an opportunity to ameliorate employment and postsecondary education disparities with their peers without disabilities. It is therefore crucial that school counselors and teachers collaborate to embed digital literacy content into high school settings to better prepare students for graduation and beyond. The EnvisionIT curriculum assists teachers in delivering digital content that integrates skills in reading and transition so students are ready to transition to 21st-century college and careers.

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