Abstract

In an effort to provide intervention for struggling adolescent readers, schools are turning increasingly toward computer-assisted reading intervention programs. This case study analyzes the perceptions, and contradictions, that exist between students, teachers, and administrators of the intervention tools used at one urban middle school. The research questions are (1) what are the cultural perceptions related to tools that exist within administrator, teacher, and student systems in one urban middle school using a computer-assisted reading intervention program and (2) in what ways do these systems’ perceptions contradict in relation to these tools? Contradictions emerged within and among the groups in how they perceived tools related to reading comprehension strategies, technology, and instructional curriculum.

Keywords: literacy, reading, perceptions, technology, intervention

Introduction

The perceptions of students, teachers, and administrators can differ greatly when it comes to curriculum used with students in the classroom. In the United States, schools often adopt commercial reading intervention programs to provide support for students identified as struggling readers. Moreover, there has been a trend toward technology-based reading intervention programs among schools in the United States. While these programs are marketed as highly engaging and highly motivational (e.g., Achieve 3000, 2015; Istation, 2015; Scholastic, 2015), there is a lack of consistent research evidence for motivational effectiveness for improved reading achievement with struggling middle grade readers (Casey, 2010; Cheung & Slavin, 2012; Kim, Samson, Fitzgerald, & Hartry, 2010; Lawson, 2011; Loadman, Sprague, Hamilton, Coffey, & Faddis, 2010). Moreover, researchers have found teachers to supplement technology-based reading
intervention programs in an effort to provide support for students’ individual needs in their classrooms (Bippert & Harmon, 2017), supporting the idea that relying on technology-based reading intervention programs alone will not support the diverse needs of struggling adolescent readers.

In the scramble to improve struggling readers’ achievement, schools continue to rely on interventions that fail to address the needs of adolescent struggling readers (Allington, 2011; Dennis, 2009; Franzak, 2006) and often implement scripted, skill-based curriculum with an emphasis on isolated skills (Gee, 2014; Hall, 2009). These skills-based curricula often lack opportunities for students to reflect and personally engage with texts (Franzak, 2006), illustrated through schools’ use of reading programs and interventions that focus on a very narrow notion of what it means to read (Dennis, 2009; Edmonds et al., 2009; Ivey & Baker, 2004). However, as Gee contended (2014), adolescent reading involves not only decoding and comprehension skills but also the social engagement and interactions connected with texts.

**Theoretical Frame: Activity Theory**

The theoretical frame used in this study is activity theory. Activity theory helps to organize, describe, and compare the various interactions and contradictions that exist between individuals within shared human activities. Activity theorists study how communication, society, and culture affect the evolving nature of activities over time (Engeström, 1999, 2001; Russell, 1997).

An activity is action that occurs with a particular motive or goal in mind (Engeström, 1999; Kuutti, 1996). The activity is the unit of analysis within an activity system, often with different groups of individuals, or subjects, moving toward common objects or goals. These systems are defined as the groups of individuals that share similar experiences while working toward similar goals. These objects are the goals or focus within these groups (Daniels, 2004; Kuutti, 1996; Russell, 1997) and can range from concrete, tangible entities to abstract goals or ideals (Kuutti, 1996). Founded on the model devised by Vygotsky (Figure 1), activity theory is based on a mediated subject–object relationship. Interactions occur among a subject of an action, a mediating artifact, and an object (Vygotsky, 1978).

**Second-Generation Activity Theory Model**

Analysis one is based on the second-generation activity theory model. Leont’ev (1978, 1981) extended Vygotsky’s mediated activity by describing the ways in which community, rules, and division of labor affect the ultimate outcome within an activity system (Engeström, 2001). Different groups of individuals, however, often develop different perceptions based on their unique experiences within their activity systems (Engeström, 1999). The second-generation activity model, as illustrated in Figure 2, changes the unit of analysis from the individual to the activity, helping to bring together interaction that occurs within individuals and communities, including the conflicts and contradictions that arise.

**Third-Generation Activity Theory Model**

Analysis two uses the third-generation activity theory model. While the second-generation model describes the ways that culture, history, and society shape the ways activity systems move toward intended goals, the third-generation activity theory model seeks to explain the ways in which different groups work together in an often transformative way toward common objects (Kuutti, 1996).

![Figure 1. Vygotsky’s model of mediated action.](image1)

![Figure 2. Second-generation activity model.](image2)
Within organizations of groups that interact and work together, the various activity systems often experience conflicts based on the differences between groups. Each part of the third-generation model, illustrated in Figure 3, organizes different components within the coexisting activity systems (Engeström, 2001). The model shown in Figure 3 illustrates how new understandings, solutions, and advances can come about as a result of these potential conflicts, which can in turn result in a multivoicedness that is suggested by the second-generation model (Daniels, 2004). The model helps to describe the power struggles, positioning, and conflicts that exist between groups working together to solve common problems or to reach common goals (Daniels, 2004).

These conflicts, in turn, can result in transformations in the ways in which tools are used, the ways power is distributed, and how objectives are reached, resulting in new understandings about how these systems interrelate (Engeström, 2001; Kuutti, 1996). These conflicts, often referred to as contradictions, can result in clashes that provide opportunities for individuals in coexisting activity systems to revisit how power, culture, tool use, or objectives are used or defined within the systems.

While describing the interactions that existed within the three interacting activity systems in this study, the term “activity system” will be referenced as “participant groups” throughout the remainder of the manuscript.

**The Current Study**

The purpose of this case study was to describe the cultural perceptions of the tools used in one middle level school implementing a computer-assisted reading intervention program. The analyses of the perceptions of students, teachers, and administrators reveal possible contradictions in viewpoints of these tools. The findings allow researchers, educators, and policy makers to better understand how these contradictions can affect the ultimate outcome of implementing computer-assisted reading interventions.

The questions guiding this study focused on the cultural perceptions that exist among students, teachers, and administrators acting as subjects within interacting activity systems, or groups, mediated through the use of a computer-assisted reading intervention program used in one urban middle level school. The research questions were as follows:

1. What are the cultural perceptions of tools for administrator, teacher, and student groups in one urban middle level school using a computer-assisted reading intervention program?
2. In what ways do the perceptions of administrators, teachers, and students related to these tools differ?

**Review of the Literature**

**Effectiveness of Technology Applications for Adolescent Learners**

While there are few studies of middle level students and computer-assisted reading interventions, findings from studies with a broader focus on technology to support literacy have been shown these programs as moderately effective. In a meta-analysis conducted by Pearson, Ferdig, Blomeyer, and Moran (2005), the 20 qualifying studies on the effectiveness of technology and literacy achievement of middle level students provided a moderate effect size of +0.52. As a subgroup, the mean effect for students identified as struggling or learning disabled was a moderate, yet smaller, +0.32. Comparing commercial versus researcher-designed technologies, the researchers reported effect sizes of +0.28 and +1.20, respectively, which indicates that the nature of the technology and its implementation in the classroom may have an influence on a program’s effectiveness.
In another meta-analysis, Cheung and Slavin (2012) analyzed 84 studies focused on technology applications with a specific focus on reading for grades K-12. Computer-based programs featuring technologies with the largest effect size were those listed as comprehensive reading programs. The comprehensive programs, which included technology as only one part of a larger reading curriculum, provided an average effect size of +0.28. The technologies listed as supplemental programs provided the lowest mean effect size. This technology classification was defined as technologies that instructed students at their assessed reading levels using computer-assisted instruction. The average effect size of these programs was +0.11. While the mean effect size for the supplemental program group remained positive, the findings of this meta-analysis favored the comprehensive programs over the supplemental programs.

While meta-analyses use quantitative methods to identify the overall causal effect of a body of empirical research (Mertens, 2009), a meta-synthesis integrates studies across methodologies, often using a qualitative approach to analysis (Sandelowski & Barroso, 2007). The methodologies included in a meta-synthesis may include qualitative findings from case studies and ethnographies, among others. A meta-synthesis of reading interventions for grades 6–12 conducted by Slavin, Cheung, Groff, and Lake (2008) included a subset of programs with a computer-assisted component. This meta-synthesis concluded that mixed-methods model technologies, in which the technology was one component of the program, had mean effect sizes of +0.24 and +0.17, respectively, while computer-assisted instruction programs, in which the curriculum is defined by the technology, had mean effect sizes of +0.21 and +0.06, respectively. Again, while mean effect sizes were positive for reading interventions that used technology, the mean effect sizes ranged from small to moderate.

Both the meta-analyses and the meta-synthesis showed promising potential effect for the use of technology with struggling readers. However, the categorical nature and characteristics of these technologies illustrated a range of findings that provide stronger support for technologies that are integrated into larger instructional curriculums.

**Adolescent Motivation and Technology**

Student motivation is an important factor to consider for supporting adolescent struggling readers (Fisher & Ivey, 2006; Guthrie & Wigfield, 2000). To provide a broad analysis of research based on technology use, an analysis of studies was conducted to synthesize the existing literature on adolescent struggling readers, in-school technology use, and motivation (Bippert & Elizondo, 2018). The range in methodologies among the 16 studies required the researcher to use a meta-synthesis approach to analyze the data (Sandelowski & Barroso, 2007).

Student agency, or control and choice, and social interactions while interacting with technology engagement were compared and ranked across the sixteen qualifying studies. While none of the 16 qualifying studies reported a negative relationship between technology use and student motivation, 5 of the studies reported inconclusive findings. Studies with the strongest and most consistent positive findings were among those in which the technology provided at least limited social interaction and open student agency. On the contrary, inconclusive findings were found most commonly among studies in which students had little or no agency with technology use and social interactions were not a feature of the technology or classroom environment.

Themes that emerged from the 16 studies supported student agency, collaboration, and ease/difficulty associated with technology. The most frequently occurring theme that emerged from six studies was student agency. This theme pairs with the positive motivational findings evident in the technology featuring social interactions among student users. Student collaboration and ease/difficulty tied as the second most occurring theme among 5 of the 16 studies. Again, the emerging theme of collaboration supports the consistent positive motivation correlations among those technologies that provided social interactions.

The scarcity of studies on technology and motivation among struggling adolescent readers supports the need for further research into how middle level students, particularly those who are positioned and identified as struggling readers, respond to different technology applications in a learning environment. Combined with the consistent positive relationship between technology that provides student agency and social interaction as motivators, the above analysis supports the claim that struggling middle level readers are less likely to find motivation in scripted commercial programs. They are more likely to be motivated by engaging in literacy activities that support student-centered choice, peer interaction, and collaboration.

**Teacher Perceptions**

A wide range of studies have focused on teacher perceptions related to technology use in the
classroom (Blachowicz et al., 2009; Capo & Orellana, 2011; Chong, 2012; Koh, Chai, & Tsai, 2014; Liu et al., 2016; Rehman & Bailey, 2014; Sancar Tomak, 2015). While overall findings among these studies were positive, teachers acknowledged certain challenges. Specifically, teachers addressed issues related to limited technological resources, technology training, and district firewall limitations.

Studies have focused teachers’ perceptions specific to literacy learning. A survey by Hutchison and Reinking (2011) investigated the perceptions of 1,441 K-12 teachers related to technology integration in the literacy curriculum. Overall, 86% of those surveyed believed that integrating technology into the literacy curriculum benefitted their program. However, two-thirds of the teachers felt that technology should serve a supplementary role within the program.

Attention to other topics related to teacher perceptions of technology in literacy programs has varied, such as its use in reading intervention programs (Gagliardi, 2011; Wright, 2010), specific technology programs (Stover, Kissel, Wood, & Putman, 2015), and teacher professional development (Hutchison, 2012). Across these studies, findings indicated that overall teacher perceptions of technology are positive. However, challenges that emerged through teachers’ responses centered on the lack of time to use technology, planning time, limited technical support, the need for professional development, technology access, and students’ limited ability to use basic technology skills.

There are few studies conducted specifically at the middle level that measures the achievement and motivational effectiveness of computer-assisted reading intervention programs. One study of perceptions was conducted with middle level teachers in a large metropolitan area in south Texas during the 2014–2015 academic year (Bippert & Harmon, 2017). The study sought to describe the ways schools used technology through computer-assisted reading intervention programs to improve student reading. Based on teachers’ responses, this study found that the teachers suggested a focus on engaging students in actual reading, moving instruction beyond a decoding focus, providing books that match student interests, and increasing student motivation to read through collaboration. Teachers indicated that none of the three programs used by the participating teachers (Achieve 3000, iStation, and Read 180) was a perfect solution and that they needed the flexibility to supplement the reading intervention programs to help support individual students’ needs.

**Methodology**

This case study was conducted at one middle level school in an urban school district in south Texas. The focal school qualified for Title I funds and served a student body that was 97% Hispanic and 88% identified as economically disadvantaged. The school served students in grades 6–8 and was implementing the Achieve 3000 reading intervention program for the first time during the 2015–2016 academic year.

**Participants**

Participants were selected using purposeful and a criterion-based process (Mertens, 2009). In an effort to select participants that would provide the most relevant data (Patton, 2015), the criteria used for selecting participants were (1) students identified as struggling readers in grades 6–8, (2) teachers and administrators who work with these students, and (3) within a middle level school campus addressing reading interventions with a computer-assisted program.

Participants of this study were four focal students, two classroom teachers, and two administrators, all at the same school. The students were seventh graders who attended the same reading intervention classroom, and the participating teachers were team teachers within that same classroom. Students were identified as struggling readers who were not receiving any additional special education services. All participating students, teachers, and administrators were given pseudonyms for confidentiality.

**Curriculum and Routine**

As part of the campus’s Response to Intervention program, Tier II students were assigned intervention classes that used the Achieve 3000 program. Students were identified as Tier II and placed in intervention classes based on the previous year’s performance on the State of Texas Assessment of Academic Readiness (STAAR) reading test as well as Achieve 3000 assessed Lexile levels that were used as the school’s universal screener.

The Achieve 3000 program provides expository texts adjusted to fit the student’s individual Lexile level and is accessed online (Achieve 3000, 2015). The online portion of the Achieve 3000 program is intended to be one of three 20-minute segments that
includes an offline whole-group instructional segment and small-group instruction (Achieve 3000, 2015). While marketed as a multi-component reading intervention program, the teachers and administrators modified the curriculum routine to fit various time constraints. In this class, for example, only the online computer-assisted portion of the Achieve 3000 program was used during the study period.

As part of the curriculum routine in this intervention classroom, students logged into their laptops while a teacher announced the online article for the day. Students then completed a Before Reading Poll and read the Lexile-adjusted articles, and then they answered multiple-choice activity question with a goal of achieving a score of 75 or better. The students would then conclude the article assignment by answering the After Reading Poll. Students were expected to successfully complete a minimum of two article assignments each week. Once the article assignment was completed, the students either recorded the scores on a weekly class chart or notified a teacher who recorded the grade for the student.

Data Collection and Analysis
The primary data collected in this study were observational field notes (Marshall & Rossman, 2006), audio and screen recordings from student computers, informal conversational interviews (Hitchcock & Hughes, 1995; Silverman, 2006), and semi-structured interviews at the beginning and end of the study (Rubin & Rubin, 2004) (see Appendices A–E for interview protocols). During weeks 2–11 of data collection, the researcher served as a technical assistant in the classroom to aid in any difficulties that might have arisen through the use of technology hardware or software. The researcher visited the participant classroom between two and four times per week for the full 53 minutes of class time. Table 1 summarizes the data collection and analysis procedure.

Analysis One: Second-Generation Activity Theory. Data were collected and analyzed in three phases. During phase one, beginning-of-study interviews took place with each of the individuals participating in the study. These semi-structured interviews focused on how each individual perceived the computer-assisted program and their perceptions of individuals in competing participant groups. Phase two occurred during weeks 2–11 of the study period. The qualitative data included observational field notes within the classroom and the school campus; audio recordings of interactions between teachers, students, and administrators; and screen recordings of the students’ use of the computer-assisted program. Phase three data included end-of-study interviews that were transcribed.

Collection and analysis occurred concurrently throughout the first three phases of data collection.

Table 1
Data Collection and Analysis Timeline

| Phases          | Data collection                                                                 | Data analysis                                      |
|-----------------|---------------------------------------------------------------------------------|----------------------------------------------------|
| Week 1Phase 1: Analysis 1 | • Semi-structured interviews with all participants  
• Interview transcriptions | • Preliminary coding of interview data               |
| Weeks 2–11Phase 2: Analysis 1 | • Observational field notes  
• Classroom audio recordings  
• Screen recordings from participant students  
• Informal conversational interviews from participants as needed  
• Weekly transcriptions of informal interviews, audio recordings, and screen recordings | • Pairing field notes with audio and screen recordings  
• Weekly ongoing identification of codes from all collected data sources |
| Week 12Phase 3: Analysis 1 | • Semi-structured interview with all participants  
• Interview transcriptions | • Identification of emerging themes based on second-generation activity theory |
| Week 13:Phase 4: Analysis 2 | • No data collected during this phase | • Identify contradictions that exist between participant groups based on third-generation activity theory |
Initial codes were identified during the first 2 weeks of data collection. During the remainder of phase two, second-generation activity theory was used as an a priori frame to organize and collapse these codes and identify emerging themes. The full code book, illustrating a priori coding, is in Appendix F.

Although data were initially coded separately by participant group, it became necessary to code across data sets due to the interactive nature of the middle level school setting. Throughout analysis one, the researcher used simultaneous coding, which allows more than one code to be attached to the same or adjacent qualitative data (Saldaña, 2016). Given the interactive nature of the setting, this provided the researchers the opportunity to attach meaning across participant groups. Codes were color coded to aid in identifying patterns in these between-group codes (Figure 4). During the concurrent data collection and analysis during analysis one, new codes emerged and previously analyzed data were then checked for consistency. Themes from the coded data were then identified separately by participant group in an effort to illustrate the various ways that the data informed each group.

Analysis Two: Third-Generation Activity Theory. The researcher used third-generation activity theory as the frame to compare the three interacting participant groups. Themes from each of the participant groups were charted and analyzed for similarities and differences that emerged from each interacting group: students, teachers, and administrators. The third-generation framework helped to address any contradictions that may have arisen among students, teachers, and administrators that could have affected the ultimate outcome of student reading goals using the Achieve 3000 program.

Findings

The research questions focused on the ways that each participant group perceived tools and their use as well as the contradictions that occurred among the three competing groups.

Students’ Perception of Tools

In the activity theory framework, tools can include both concrete objects and mental processes. For participant students, the use of the Achieve 3000 program, the laptop computers, and reading strategies all had an effect on the students’ progress toward their reading and learning goals. Table 2 shows a list of the codes used in the analysis of student perception of tools.

Achieve 3000 Program. Students described the program in both positive and negative terms in beginning- and end-of-study interviews. The four focal students expressed that although they personally felt the program was good, they also described it as boring to classmates. As Jenna explained:

Jenna: Well at the beginning, I was like the other kids, like I didn’t like it because it was a lot of reading, but like I was doing the Thought Questions and everything, because I like writing.

Robert said that although he personally liked Achieve 3000, others in the class did not.

Robert: I think it’s good . . . but students are saying it’s bad because . . . I must add the number one thing that they hate the most about Achieve 3000 because it’s boring and everything, but I don’t think that it is boring, because it’s helping you to learn more and focus more and thinking.

Of the four focal students, two stated that they enjoyed the articles provided by the program, and two preferred the technology-based delivery of instruction. However, based on students’ actual engagement with and use of the Achieve 3000 program tools, statements made during interviews contradicted observational and screen recording data. These contradictions are described below.

Figure 4. Simultaneous color codes.
Laptops and Technology. Contradictions to students’ stated perceptions of the Achieve 3000 program occurred during observations and screen recordings that took place throughout the course of the study. Hardware and software difficulties occurred throughout weeks 2–11 of data collection, which occasionally placed a limit on the amount of time students were able to engage in the program. Laptop reliability issues not only contributed to lost time at the beginning of the instructional period but also would also occasionally cost the student a day’s worth of online work.

All three participant groups confirmed that the Achieve 3000 program represented the only time that students had access to computers or the Internet. There were times when participating students would choose to focus on goals outside of the computer- or technology-based program. For example, one participating student, Brandon, was observed on three occasions switching from the Achieve 3000 program to an open browser tab where he would upload a video game from the Internet during times when neither of the participating teachers was paying direct attention to his actions. Other appropriations of the laptop computers included accessing music and visiting Internet sites unrelated to their curriculum. Students’ technology appropriations created contradictions, or disruptions, and hindered their progression in the reading program.

Strategy Tools. Another contradiction in students’ use of tools related to their perceptions and use of strategies. Teachers routinely reminded student to use one of three strategies provided through the computer-assisted program: summarizing, generating questions, and setting purposes. While the program provided other strategy tools that students could use during and after reading the articles, the three strategies described above were the ones that were prompted by teachers. During the course of the study, however, only one of the focal students was observed using any of these strategy tools.

Brandon was the only participating student observed using a strategy tool—the summary tool. Although he used this “strategy” approximately half of the time during screen recordings, he was doing so without actually using the cognitive strategy itself. In fact, Brandon was observed copying and pasting text into the summary fields so that although he was technically using the online tool, he was not using the

| Tools                        | Description                                                                 |
|------------------------------|-----------------------------------------------------------------------------|
| Misc_reading_strategy        | Student chooses to use own personal reading strategy not related to program strategies |
| Program_appropriation        | Student changes the nature of the program to fit their own needs             |
| Program_assistance_not      | Students do not use any program tools/strategies during duration of activity |
| Program_challenge            | Student responds to a challenge associated with the program                 |
| Program_competence           | Student responds to competence with program                                 |
| Program_strat_used           | Student uses a strategy provided by the program’s tools                      |
| Strat_challenge              | Student responds to a challenge related to a program strategy                |
| Teach_as_teacher             | The program or technology is referred to as instructional tool               |
| Tech_assistance_used         | Technology is used as an aid, not related to the program tools               |
| Tech_hardware_issue          | Laptop computer hardware causes student difficulty                          |
| Tech_in-school               | Student describes the general use of computers in school                     |
| Tech_positive                | Student responds positively to technology                                   |
| Tech_software_issue          | Laptop software causes difficulty for students                               |
| Tech_transition              | Transition at beginning of class affecting program use                       |
| Tech_user                    | Ability of student using technology affecting program use                   |
| Text_negative                | Student responds negatively to text                                          |
| Text_positive                | Student responds positively to text                                          |

Table 2
Student Perception of Tools Codes
cognitive strategy. Brandon was following and abiding by the curriculum routine without actively engaging with the text as the summarizing strategy tool intended.

Jenna, Robert, and Ruby were not observed using any of the three teacher-prompted strategy tools. In informal, conversational interviews, they each explained their aversions to using the summarization tool. For Jenna, the strategy was time consuming as she found it difficult to type into the field. Robert stated that it disrupted his train of thought, and he became confused and forgot what he had previously read. Ruby, on the other hand, simply stated that she did not like the strategy. Throughout the 11 weeks of screen recordings and observations, these three students read the text aloud to themselves, worked collaboratively with peers, reread texts, verbally asked text-based question with peers and teachers, and engaged in think-alouds. These self-selected strategies were used by students as needed, and without prompting from teachers.

Except for Brandon, students rarely used the Achieve 3000 program strategy tools and often disregarded them completely. More commonly, the participating students worked toward success with the program by choosing reading strategies based on what they personally felt would help them engage with the text.

**Teachers’ Perception of Tools**
The participating teachers’ daily interactions with the Achieve 3000 program focused largely on the students’ expected behaviors within the program, which are hereby described as the “curriculum routines.” Teachers also discussed challenges related to the laptop computers. The teachers’ perceptions of these tools are described below. Table 3 shows the codes used for the analysis of teacher perception of tools.

**Achieve 3000 Program.** Both Ms Cerda and Ms Garza, the participating teachers, made positive comments about the Achieve 3000 program in both the beginning- and the end-of-study interviews.

Ms Cerda: Another thing that I like is when they’re reading the questions, there’s some words that they don’t understand, they can just highlight and then they can you know click another tab, and they’ll be able to find the definition to that word . . . I like the articles, I think they’re interesting . . . and the one thing I always tell them is, according to your reading level, so you should be able to read it.

In addition to the vocabulary support tools, other benefits the teachers noted centered on the instructional content, specifically in reference to the skills focus and scaffolding of reading materials to fit the students’ assessed Lexile levels.

The teachers did note that not all of the content was equally sensitive to the students’ needs. As Ms Garza described, some articles supported visual learners:

Ms Garza: I like the way some of these articles have the videos, I wish a lot more of them had videos, or some kind of different media aside from the reading, yes, yes. But not all of them do, especially the nonfiction, to show a short video about the president, or about that event that happened, it would really help our struggling readers and our visual learners.

When addressing the needs of some of the more challenged readers in the classroom, particularly those who received additional support through the special education program, they found that the tools provided by the program were not sufficient. Despite the ability for the program to adjust the readability to match the students’ assessed Lexile levels, these students still required one-on-one help with the texts.

**Laptops and Technology.** The teachers found difficulties related to the laptop computers provided for student use in their classrooms. These issues often resulted in the disruption of student engagement:

Ms Garza: The computers tend to be slow; we have some working, not working, from day to day. They restart on their own because they are used in other classes throughout the day; so getting past the first 15 minutes of confusion for the kids, we’ve lost a lot of instruction.

Ms Garza’s concerns about the reliability of the laptop computers were supported through observational data, as students were frequently forced to restart their laptops or try one or two additional laptops before logging into the Achieve 3000 program. Given the 10- to 15-minute delay in student login, and 10 minutes for log out and storage of the
laptops at the end of class, the 53-minute class period effectively provided students with only 28 minutes of instructional time. When asked, the teachers explained that this limitation on instructional time due to difficulties in transitions at the beginning and end of class resulted in the class using only the computer-assisted portion of the Achieve 3000 program.

Like the focal students, teachers also reported that the Achieve 3000 program was the only time during the course of the school day that students had access to technology. According to Ms Cerda, students did not have other access to computers in other content areas; students’ computer use was limited to their work in the Achieve 3000 program.

Both participant teachers described how scheduling issues resulted in difficulties with the laptop computers. Because this reading intervention class occurred during the last period of the school day, scheduling had a direct impact on the reliability of the laptops. Because the laptops had been used almost continuously throughout the school day prior to students in this classroom, the transition time at the beginning of class was often extended due to low battery life and improper shutdown from the previous laptop users. Teachers described this scheduling challenge as a potential cause for students to be less motivated to engage with the program once they logged into Achieve 3000.

**Strategy Tools.** Throughout the course of the study, teachers frequently prompted the use of the small number of strategies supported by the Achieve 3000 program: summarizing, asking questions, and setting a purpose. While these strategy tools were readily available for students to use, they were not observed being taught or supported by the teachers during the study period. When asked in informal, conversational interviews, the teachers responded that they had intended to support strategy instruction at the beginning of the academic year. However, the technology issues and time spent transitioning onto the laptop computers resulted in their decision to focus solely on the technology component of the program during class time. This focus on three strategies resulted in a narrowing of the means that students were expected to engage with the program and the online texts.

**Administrators’ Perception of Tools**
The tools that were the focus for the administrators in this study were campus technology resources and the Achieve 3000 program. Because the administrators’ involvement with the program was campus-wide, perceptions of tool use were reflected in this difference in program responsibility. Table 4 shows codes that were used for administrator perception of tools.

**Laptops and Technology.** One important way the administrators supported the Achieve 3000 program was by scheduling the approximately 300 students identified as struggling readers into the program. This resulted in the program being integrated by teachers in various ways. Two of the teachers used the program as marketed by Achieve 3000 in what the administrators called STAAR reading classes, while

| Tools          | Codes                                      |
|----------------|--------------------------------------------|
| Tech_user      | Issues related to user challenges          |
| Tech_hardware  | Issues related to hardware challenges      |
| Tech_curr      | Issues related to curriculum routine       |
| Strat_prompt   | Teacher prompts student use of strategy    |
| Strategy_assump| Teacher assumption of strategy use positive|
| Student_Tech_neg| Teacher view of negative student           |
| Tech_positive  | Positive perception of technology          |
| Text_positive  | Positive perception of text                |
| Tech_challenge | Challenge with technology use with program |
| Tech_in-school | Teacher description of school-wide technology use |

Table 3

**Teacher Perception of Tools Codes**
the remaining teachers used the program with either limited time or limited technology resources.

In addition to the STAAR reading classes, Ms Cerda and Ms Garza had a full 53-minute class period for program use. However, other teachers using the Achieve 3000 program used it with students during a 30-minute advisory period, referred to as Response to Intervention (RTI) classes. As per the participating teachers, when the program was used during these truncated advisory times, program use was reduced to 10–15 minutes of actual online time, although according to one administrator the students could get as much as 25 minutes of online time. As per Ms Montero, one of the participating administrators, the need for providing support to such a large number of students resulted in the different ways in which the program was utilized with students.

Ms Montero: It’s different for the STAAR and the RTI. The RTI periods, they’re shorter . . . 30 minutes max, by the time the kids come in, sit down, log in, I would say they use maybe about 25 minutes, so with that they go in, they read the stories, they do the activities . . . they do it back to back pretty fast.

Thus, students received different levels of support based on if they had been placed in a STAAR class or one of the shorter RTI classes during the advisory period. This was, in effect, a contradiction to the typically marketed use of the Achieve 3000 program for those teachers who were using it with either limited resources or time.

Achieve 3000 Program. Based on interviews, both participating administrators were pleased with the Achieve 3000 program being used at their campus. According to one of the participating administrators, Ms Montero, structure and computer interface were seen as strong characteristics:

Ms Montero: I think it’s going very well, and it’s good that it’s something that is very structured, and the kids need that. And I think that they’ve always enjoyed things that are on the computer, so not necessarily sitting in class, listening to lecture, and doing things on worksheet, and writing narrative, so they like the interaction with the computer . . .

Similarly, Ms Arguello, a participating administrator, agreed that the computer interface was a bonus because it eliminated the need for some ancillary materials:

Ms Arguello: Well in the Achieve 3000, they’re . . . it would be like if they had a workbook, but it’s online . . . They can do everything online, so they don’t need, you know, necessarily a notebook to be taking notes.

The belief that students prefer computer-assisted instruction to traditional classroom instruction appeared to be a positive attribute of the Achieve 3000 program.

Whereas Ms Montero was aware how the limited instructional time provided by some of the classes also limited the ways that the program could be used by teachers and students, Ms Arguello stressed how teacher support was key to student success:

Ms Arguello: I think it helps, depending on how much the teacher also puts in . . . the kids who are actually getting a lot

| Tools          | Program_challenge | Achieve 3000 challenges for teachers/students/administrators |
|---------------|-------------------|-------------------------------------------------------------|
| Tech_as_teacher | Technology as instructional tool/focus                       |
| Tech_in-school | School-wide technology use                                   |
| Tech_positive  | Positive perception/statement regarding technology           |
| Program_positive | Positive perception of program                                |
| Text_positive  | Positive perception/statement regarding text                |
more, who are getting some direct instruction from the teacher before they start with their activities are scoring, their average score is higher than the kids that are not.

While Ms Arguello found the computer-assisted component of the Achieve 3000 program to be a strength, she also stressed the importance of direct strategy instruction as necessary for student success. On the other hand, Ms Montero viewed the program of having the potential to support student learning even in the absence of teacher preparation:

Ms Montero: Everything’s built in, the teachers don’t even have to . . . I know the representative said if you don’t do lesson plans, or if you forget to do something, like, everything is there. The [state standards] are all aligned.

While the participating administrators were aware of limitations placed on the Achieve 3000 program’s use for the RTI teachers, the value placed on the computer-assisted component as a stand-alone or supplementary reading program implied a change in perception of how instruction should be delivered—from a teacher-facilitated to a technology-centered model.

Contradictions among Participant Groups: Third-Generation Activity Theory Model

The tools that emerged across participant groups were labeled strategies, laptop computers, and curriculum. The perceptions of these three tools are graphically illustrated, and color coded to show findings among students, teachers, and administrators. Where participant groups shared perceptions, which occurred among teachers and students, a combined color-code is used.

Curriculum. The differences in how the intervention curricula were perceived by teachers and administrators were a key contradiction that emerged from analysis two. Achieve 3000 is marketed as a multi-component reading intervention program. While the main focus is the computer-assisted component, whole-class strategy instruction and small-group support are also identified as part of the program (Achieve 3000, 2015). As acknowledged by the administrators, to provide instruction for the nearly 300 students who were identified as in need of intervention, there were a variety of classroom settings in which students were utilizing the reading program. Therefore, various classroom settings resulted in the elimination of whole- and small-group instruction. In some of these settings, time and computer resources were limited. In the participating classroom, challenges with the laptop computers led to reduced instructional time, which resulted in limiting the program to the computer-assisted component. In the study classroom, the computer-assisted reading intervention program became the sole source of reading instruction and only the computer-assisted component was used by the participating teachers during the study period. This example illustrates a contradiction between how administrators and teachers perceived the use of the instructional program and how the overall reading intervention curriculum functioned within the classroom.

Laptops and Technology. Contradictions also emerged in how the laptop and technology tools were perceived by all three participant groups. Through interviews and through classroom observations, it was evident that teachers and students found laptop reliability issues contributed to time lost using the instructional program, which negatively impacted their perception of the value of the laptop and technology as instructional tools. However, contradictions related to the motivational impact of the laptop and technology emerged between the administrator and student groups. While the administrators had stated that the computer-based program was perceived to be more engaging for students than traditional instruction, the participating students not only indicated that the program was “boring,” but were also observed visiting outside webpages during instructional time.

Strategies. Another key contradiction that emerged across groups was the perceptions of strategies. While the classroom teachers prompted the use of three program-provided strategies, all but one student disregarded these strategies while engaged with article assignments. Instead, the three students drew from self-selected dialogic strategies such as peer collaboration, reading aloud, and think-alouds to aid in comprehension. Furthermore, although administrators stressed the importance of teacher support of strategies for student and program success, strategy instruction and support were neither observed nor recorded during the study period. Again, due to time constraints, teachers had centered on the computer-assisted program during the 28 minutes of instructional time each day, and they often prompted the program-supported strategies for
students to use. This revealed a contradiction of strategy perceptions across all three of the competing participant groups.

Discussion

The participants’ perceptions of tools in the first analysis, particularly by struggling readers, were especially revealing in this case study. In this instance, perceptions of reading strategies and technology tools contradicted one another across participant groups.

Perceptions of Reading Strategies

While one student, Brandon, was observed using the summarizing strategy prompted by the teachers, the other three focal students did not. Jenna, Robert, and Ruby’s ability to use self-selected strategies allowed them to make sense of the texts, which subsequently enabled them to comprehend the texts enough to successfully complete several activities. Brandon’s reliance on summarization as his sole reading strategy did not appear to aid him in making enough sense of the text and, thereby, limited his ability to find the same success as his peers.

Explicit strategy instruction and strategy modeling were not observed at any time during the study period. While the literature supports the importance of explicit strategy instruction for struggling readers (Allington, 2015; Armbruster, Anderson, & Ostertag, 1987; Dole, Duffy, Roehler, & Pearson, 1991; Dole, Valencia, Greer, & Waldrop, 1991; Edmonds et al., 2009; Guthrie et al., 2004; Rosenshine, Meister, & Chapman, 1996), the mechanical and curricularized ways that strategy instruction is often implemented fail to honor the existing strategies that struggling readers engage in daily. For students to be able to choose strategies that they find most beneficial, as three of the participant students had, teachers must first provided students instruction in a range of strategies that will provide a way for them to actively make sense of challenging texts. Teachers need to recognize students’ need for comprehension monitoring strategies that may not necessarily be as easy to record and assess (Maniates & Pearson, 2008; Pressley, 2000). The strategies included in a student’s strategy inventory should include not only visible, measurable strategies but also more social and dialogic strategies similar to ones used by three of the participant students.

The use of visible, curricularized reading comprehension strategies does not guarantee that active text engagement will happen (Aukerman, 2008). Dialogic strategies such as think-alouds, comprehension monitoring, collaboration, and text-based discussions are far more difficult to be measured by teachers or computer-assisted program. However, these strategies can become powerful additions to students’ strategy inventories.

Perceptions of Technology

The technology used in this reading intervention classroom, Achieve 3000, is marketed as what Cheung and Slavin (2012) would classify a comprehensive reading intervention program. However, the classroom in this study used the program in a way that Cheung and Slavin would most closely classify as a supplemental program centered on the computer-assisted component as the sole means of reading support. Such programs provided a small (+0.11) effect size in their meta-analysis.

Additionally, those technologies that provided no social interaction as a feature of the curriculum and were limited to no student agency or choice provided inconsistent findings on positive motivational correlations (Bippert & Elizondo, 2018). While students in this classroom were permitted to work with peers, the teachers’ curriculum routine did not provide any student agency in text choice. While administrators perceived the computer-assisted intervention as engaging, students not only stated that the program was boring, they were observed visiting outside webpages on occasion. Because this computer-assisted reading intervention program provided limited socialization without student agency, it likely did not have sufficiently positive motivational correlations associated with it. Therefore, it is difficult to support the notion that this particular computer-assisted reading intervention program as used in this classroom was “highly engaging” or “highly motivational.”

The class did not use the Achieve 3000 program as intended by the publisher because of difficulties that arose through the use of the computers provided to the students. This was part of a double-blocked English language arts and reading class, and students were together for at least two class periods per day, which increased their opportunities to build community bonds. However, because this class took place at the end of the school day, the teachers stated that they felt the students were less motivated to work on the reading program at this time of the school day.
Although the four focal students were general education students, this class did include some other students who were received accommodations through special education. Four students, not including the focal students, were on behavioral improvement plans. The nature of the class being at the end of the day and comprising students who required more teacher assistance than students in reading interventions made this particular reading intervention class more of a challenge than a typical intervention class at this campus. This could have resulted in a higher than usual number of social contradictions that could have interfered with the students’ engagement in the curriculum routine and moving toward their reading goals.

Limitations
This study was a case study of one middle level school, and the findings cannot be generalized across all middle level schools and intervention programs. While the use of case study methodology allowed for a deep description of qualitative data, the small number of participants also placed a limitation on the generalizability of the study’s findings. Additionally, this class was not using the Achieve 3000 program as marketed due to technology and time limitations faced by students and teachers. Also, because the focal class took place at the end of the school’s instructional day, students experienced technology resource issues related to prior use throughout the instructional day. While serving as a participant observer in the classroom, the researcher did not interact with students in ways that would change the nature of how the students utilized the laptop computers or reading strategies. However, the presence of a third facilitator in the classroom possibly affected student behaviors and motivation during the study period, which could have potentially influenced their use of the laptop computers and strategy tools.

Conclusion
The findings in this study revealed not only the ways in which one middle level school approached strategy instruction with struggling readers but also the ways schools may value the use of technology with struggling students. The perceptions of the value of technology in this study—either as an instructional tool or motivator—differed in various ways among teachers, students, and administrators. A close analysis of how each of these participant groups described and interacted with the tools described in this case study revealed that assumptions about these values can be incorrect. Based on the findings in this study, further investigations of how tools are perceived and used by schools—and particularly by students—are needed to effectively evaluate their place in middle level reading programs.

If they step away from marketing promises, schools can, perhaps, focus their human and technology resources toward what researchers tell us is most effective and motivational: student agency and choice, a range of comprehension strategies to promote active engagement, and opportunities for social engagement and collaboration. While technology holds many possibilities for student learning, schools need to consider the most effective ways to use this technology.

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References
Achieve 3000. (2015). The next dimension in response to intervention. Retrieved from http://www.achieve3000.com/texas
Allington, R. L. (2011). Reading intervention in the middle grades. Voices from the Middle, 19(2), 10–16.
Allington, R. L. (2015). What really matters for middle school readers. Upper Saddle River, NJ: Pearson Education.
Armbruster, B. B., Anderson, T. H., & Ostertag, J. (1987). Does text structure/summarization instruction facilitate learning from expository texts? Reading Research Quarterly, 22(3), 331–346. doi:10.2307/747972
Aukenman, M. (2008). In praise of wiggle room: Locating comprehension in unlikely places. Language Arts, 86(1), 52–60.
Bippert, K., & Elizondo, A. (2018). Technology, motivation, and early adolescent readers. Manuscript submitted for publication.
Bippert, K., & Harmon, J. (2017). Middle school teachers’ perceptions of computer-assisted reading intervention programs. Reading Psychology, 38(2), 203–230. doi:10.1080/02702711.2016.1245691
Blachowicz, J., Bates, A., Berne, J., Bridgman, T., Chaney, J., & Perney, J. (2009). Technology and at-risk young readers and their classrooms. Reading Psychology, 30, 387–411. doi:10.1080/0270271090233576
Capo, B. H., & Orellana, A. (2011). Web 2.0 technologies for classroom instruction: High school teachers’ perceptions and adoption
factors. *Quarterly Review of Distance Education, 12*(4), 235–253.

Casey, B. L. (2010). *The influence of an interactive reading program on adolescent students in middle school* (Unpublished manuscript). Seton Hall University, South Orange, NJ.

Cheung, A., & Slavin, R. E. (2012). How features of educational technology applications affect student reading outcomes: A meta-analysis. *Educational Research Review, 7*, 198–215. doi:10.1016/j.edurev.2012.05.002

Chong, H. N. (2012). *Perception and use of instructional technology: Teacher candidates as adopters of innovation* (Doctoral dissertation), University of Southern California. Retrieved from ProQuest (AAT3513740).

Daniels, H. (2004). Activity theory, discourse and bernstein. *Educational Review, 56*(2), 121–132. doi:10.1080/00131904.2004.10134681

Dennis, D. V. (2009). “I’m not stupid”: How assessment drives (in)appropriate reading instruction. *Journal of Adolescent and Adult Literacy, 53*(4), 283–290. doi:10.1598/JAAL.53.4.2

Dole, J. A., Duffy, G. G., Roehler, L. R., & Pearson, P. D. (1991). Moving from the old to the new: Research on reading comprehension instruction. *Review of Educational Research, 61*(2), 239–264. doi:10.3102/00346543061002203

Dole, J. A., Valencia, S. W., Greer, E. A., & Waldrop, J. L. (1991). Effects of two types of prereading instruction on the comprehension of narrative and expository text. *Reading Research Quarterly, 26*(2), 142–159. doi:10.2307/747979

Edmonds, M., Vaughn, S., Wexler, J., Reutebuch, C. K., Cable, A., Tackett, K. K., & Shackenberg, J. W. (2009). A synthesis of reading interventions and effects on reading comprehension outcomes for older struggling readers. *Review of Educational Research, 79*(1), 262–300. doi:10.3102/0034654308325998

Engeström, Y. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R. Punamaki (Eds.), *Perspectives on activity theory* (pp. 19-38). New York, NY: Cambridge University Press.

Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133–156. doi:10.1080/1363908020208747

Fisher, D., & Ivey, G. (2006). Evaluating the interventions for struggling adolescent readers. *Journal of Adolescent and Adult Literacy, 50*(3), 180–189. doi:10.1598/JAAL.50.3.2

Franzak, J. K. (2006). Zoom: A review of the literature on marginalized adolescent readers, literacy theory, and policy implications. *Review of Educational Research, 76*(2), 209–248. doi:10.3102/00346543076002209

Gagliardi, L. (2011). Examining the Scholastic READ 180 teachers’ perceptions regarding local setting factors and role of the teacher impacting the program’s implementation in seventh grade at three middle schools (Doctoral dissertation). University of Hartford. Retrieved from ProQuest (AAT3468186).

Gee, J. P. (2014). *Social linguistics and literacies: Ideology in discourses* (4th ed.). London, UK: Routledge.

Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. *Handbook of Reading Research, 3*, 403–422.

Guthrie, J. T., Wigfield, A., Barbosa, P., Perenovich, K. C., Taboada, A., Davis, M. H., . . . Tonks, S. (2004). Increasing reading comprehension and engagement through concept oriented reading instruction. *Journal of Educational Psychology, 96*(3), 403–423. doi:10.1037/0022-0663.96.3.403

Hall, L. A. (2009). Struggling reader, struggling teacher: An examination of student-teacher transactions with reading instruction and text in social studies. *Research in the Teaching of English, 43*(3), 286–309.

Hitchcock, G., & Hughes, D. (1995). *Research and the teacher: A qualitative introduction to school-based research*. London, UK: Routledge.

Hutchison, A. (2012). Literacy teachers’ perceptions of professional development that increases integration of technology into literacy instruction. *Technology, Pedagogy and Education, 21*(1), 37–56. doi:10.1080/1475939X.2012.659894

Hutchison, A., & Reinking, D. (2011). Teachers’ perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly, 46*(4), 312–333. doi:10.1002/RQQ.002

Istation. (2015). *Personalized learning that makes a difference*. Retrieved from http://info.istation.com/productsbrochure

Ivey, G., & Baker, M. I. (2004). Phonics instruction for older students? Just say no. *Educational Leadership, 61*(6), 35–39.
Kim, J. S., Samson, J. F., Fitzgerald, R., & Hartry, A. (2010). A randomized experiment of a mixed-methods literacy intervention for struggling readers in grades 4-6: Effects on word reading efficiency, reading comprehension and vocabulary, and real reading fluency. *Reading and Writing, 23*, 1109–1129. doi:10.1007/s11145-009-9198-2

Koh, J. H., Chai, C. S., & Tsai, C. (2014). Demographic factors, TPACK constructs, and teachers’ perceptions of constructivist-oriented TPACK. *Journal of Educational Technology & Society, 17*(1), 185–196.

Kuutti, K. (1996). Activity theory as a potential framework for human-computer interaction research. In B. Nardi (Ed.), *Context and consciousness: Activity theory and human computer interaction* (pp. 17–44). Cambridge, MA: MIT Press.

Lawson, S. (2011). *The read 180 program: Analysis of program effect on the reading achievement, motivation, engagement, and self-efficacy on sixth grade middle school students*. Baltimore, MD: College of Notre Dame of Maryland.

Leont’ev, A. N. (1978). *Activity, consciousness, and personality*. Pacifica, CA: Marxist Internet Archives. Retrieved from https://www.marxists.org/archive/leontev/works/activityconsciousness.pdf

Leont’ev, A. N. (1981). *The development of mind*. Pacifica, CA: Marxists Internet Archive. Retrieved from http://marxists.anu.edu.au/archive/leontev/works/developmentmind.pdf

Liu, M., Navarrete, C. C., Scordino, R., Kang, J., Ko, Y., & Lim, M. (2016). Examining teachers’ use of iPads: Comfort level, perception, and use. *Journal of Research on Technology in Education*, 48(3), 159–180. doi:10.1080/15391523.2016.1175853

Loadman, W., Sprague, K., Hamilton, J., Coffey, D., & Faddis, B. (2010). Using randomized clinical trials to determine the impact of reading intervention on struggling adolescent readers: Reports of research from five nationally funded striving readers grants. Presented at the Society for Research on Educational Effectiveness.

Maniates, H., & Pearson, P. D. (2008). The circuicularization of comprehension strategies instruction: A conspiracy of good intentions. In Y. Kim, V. J. Risko, D. L. Compton, D. K. Dickinson, M. K. Hundley, R. T. Jimenez, D. W. Rowe (Eds.), *57th Yearbook of the national reading conference* (pp. 271–282). Oak Creek, WI: National Reading Conference.

Marshall, C., & Rossman, G. B. (2006). *Designing qualitative research* (4th ed.). Thousand Oaks, CA: Sage.

Mertens, D. M. (2009). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Thousand Oaks, CA: Sage.

Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Thousand Oaks, CA: Sage.

Pearson, P. D., Ferdig, R. E., Blomery, R. L., & Moran, J. (2005). The effects of technology on reading performance in the middle-school grades: A meta-analysis with recommendations for policy. Naperville, IL: North Central Regional Educational Laboratory.

Pressley, M. (2000). What should comprehension instruction be the instruction of? In M. I. Kamil, P. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 545–561). Mahwah, NJ: Lawrence Erlbaum Associates.

Rehman, A. P., & Bailey, J. M. (2014). Technology integration in a science classroom: Preservice teachers’ perceptions. *Journal of Science Education and Technology, 23*(6), 744–755. doi:10.1007/s10956-014-9507-7

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research, 66*(2), 181–221. doi:10.3102/0034654306600218

Rubin, H. J., & Rubin, I. (2004). *Qualitative interviewing: The art of hearing data* (2nd ed.). Thousand Oaks, CA: Sage.

Russell, D. R. (1997). Rethinking genre in school and society: An activity theory analysis. *Written Communication, 14*(4), 504–554. doi:10.1177/0741088397014004004

Saldana, J. (2016). *An introduction to codes and coding: The coding manual for qualitative researchers* (3rd ed.). Thousand Oaks, CA: Sage.

Sancar Tokmak, H. (2015). Pre-service teachers’ perceptions of TPACK development after designing educational games. *Asia-Pacific Journal of Teacher Education, 43*(5), 392–410. doi:10.1080/1359866X.2014.939611

Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. New York, NY: Springer Publishing Company.

Scholastic. (2015). *The read 180 experience*. Retrieved from http://www.scholastic.com/read180/read-180-experience/literacy-program-instructional-technology.html
Silverman, D. (2006). *Interpreting qualitative data: Methods for analyzing talk, text and interaction*. Thousand Oaks, CA: Sage.

Slavin, R. E., Cheung, A., Groff, C., & Lake, C. (2008). Effective reading programs for middle and high schools: A best-evidence synthesis. *Reading Research Quarterly, 43*, 290–322. doi:10.1598/RRQ.43.3.4

Stover, K., Kissel, B., Wood, K., & Putman, M. (2015). Examining the literacy teachers’ perceptions of the use of voiceThread in an elementary, middle school, and a high school classroom for enhancing instructional goals. *Literacy Research and Instruction, 54*, 341–362. doi:10.1080/19388071.2015.1059911

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wright, R. (2010). Impact of a web-based reading program on sixth-grade English language learners (Doctoral dissertation), Nova Southeastern University. Retrieved from ProQuest Dissertations and Theses (AAT3528615).
Appendix A. Student Beginning-of-Study Interview

1. How is the reading class going so far this year?
2. Tell me about your reading goals for the end of this year.
3. Tell me about the Achieve 3000 program.
4. Tell me about what you do in class each day.
5. When you are using the Achieve 3000 program, you are on the computer. Is this program similar or different from other ways that teachers have used computers in their classroom? In what ways?
6. Describe the ways you use computers or other types of technology, like smart phones, tablets, or video games, outside of school.
7. Do you think that these types of technology uses help or hurt how you learn in school? Explain.

Appendix B. Administrator and Teacher Beginning-of-Study Interview

1. How is the reading class going so far this year?
2. Tell me about your goals for the students at the end of this year.
3. Tell me about the Achieve 3000 program.
4. Tell me about what you do in this class each day, or when you visit.
5. Is the technology used in this reading intervention program similar or different from other ways that teachers are using computers in their classroom? In what ways?
6. Do you think that these types of technology uses help or hurt how you learn in school? Explain.

Appendix C. Student End-of-Study Interview

1. How is the reading class going so far this year?
2. Tell me about your reading goals. Do you think that you will reach these goals?
3. Now that the school year will be over soon, tell me about the Achieve 3000 program.
4. Describe things about reading in this class that are easier now than they were at the beginning of the year.
5. Describe things about reading in reading class that you still find difficult.
6. How is this class similar to other ones that you are in this school year?
7. How is this class different from others that you are in this year?

Appendix D. Administrator and Teacher End-of-Study Interview

1. How did the reading class going this year?
2. Tell me about the goals that you have for these students. Do you think that you will reach these goals?
3. Now that the school year will be over soon, tell me about the Achieve 3000 program.
4. How is this class similar to other ones that you teach/visit this school year?
5. How is this class different from others that you teach/visit this year?
Appendix E. Open-Ended Conversational Interview Guide

1. What did you mean when you said . . .?
2. What did you mean when you (did) . . .?
3. What did you think when . . .?
4. Tell me about (action).
5. Why do/don’t you . . .
## Appendix F.

### Code Book for All Participant Groups

| Code Names | Description |
|------------|-------------|
| **Student Codes** | |
| Community | |
| Admin_interaction | Student description of administrator interactions |
| Student_collaboration | Students work together on program component |
| Student_relatedness | Student exhibits general relatedness, positive or negative |
| Teacher_relatedness | Student exhibits general relatedness toward teacher, positive or negative |
| **Disruptions** | |
| Autonomy_disruption | Student’s autonomy causes a disruption in program activity |
| Competence_disruption | Student’s competence causes a disruption in program activity |
| Miscellaneous_disruption | General disruption in program activity not related to any previously described disruptions |
| Schedule_disruption | Unscheduled change in school or class schedule causes disruption in student program use |
| Social_disruption | Social activity unrelated to program use causes disruption can be caused by student or by others |
| Tech_disruption | Technology causes some form of disruption in program use |
| Time_schedule | The nature of class and general schedule causes disruption in program use |
| **Division of Labor** | |
| Autonomy_curriculum | Student expresses autonomy through program use student choice |
| Req_teacher_aid | Student requests teacher aid |
| Req_teacher_attention | Student request teacher for general attention |
| Student_as_teacher | Student regards self or other student as instructional aid |
| Teacher_as_authority | Student regards teacher as an authority Figure |
| Teacher_as_facilitator | Student regards teacher as facilitator for reading program |
| Teacher_as_teacher | Student regards teacher for instructional aid |
| **Object & Goals** | |
| Goals_long_term | Student describes goals beyond those of this academic year |
| Goals_short_term | Student describes goals within the academic year |
| Progress_student_check | Student checks their progress either on teacher system/chart or on program website |
| Progress_teacher_check | Teacher checks student progress either on computer or on student program website |
| **Rules** | |
| Routine_curriculum | Students respond to alert others to routines related to program use |
| Routine_rules | Students respond to alert others to routines related to general classroom rules |
| Routine_strat | Students respond to alert others to routines set in place regarding program strategies |
| Rules_behavioral | Challenge with technology use with program |
| Tools |  |
|-------|--------------------------------------------------|
| Misc_reading_strategy | Student chooses to use own personal reading strategy not related to program strategies |
| Program_appropriation | Student changes the nature of the program to fit their own needs |
| Program_assistance_not | Students do not use any program tools/strategies during duration of activity |
| Program_challenge | Student responds to a challenge associated with the program |
| Program_competence | Student responds to competence with program |
| Program_strat_used | Student uses a strategy provided by the program’s tools |
| Strat_challenge | Student responds to a challenge related to a program strategy |
| Teach_as_teacher | The program or technology is referred to as instructional tool |
| Tech_assistance_used | Technology is used as an aid, not related to the program tools |
| Tech_hardware_issue | Laptop computer hardware causes student difficulty |
| Tech_in-school | Student describes the general use of computers in school |
| Tech_positive | Student responds positively to technology |
| Tech_software_issue | Laptop software causes difficulty for students |
| Tech_transition | Transition at beginning of class affecting program use |
| Tech_user | Ability of student using technology affecting program use |
| Text_negative | Student responds negatively to text |
| Text_positive | Student responds positively to text |

| Teacher Codes |  |
|----------------|--------------------------------------------------|
| Community |  |
| Admin_teacher_interact | Teacher and administrator interactions described or observed |
| Student_relatedness | Student exhibits general relatedness, positive or negative |
| Disruptions |  |
| Extrinsic_motivator | Teacher uses/describes extrinsic motivator to influence student behavior |
| Rules_behavioral | Teacher responds to student behavior/misbehavior |
| Schedule_disruption | General disruption in program activity not related to any previously described disruptions (i.e., fire drill) |
| Division of Labor |  |
| Teacher_as_teacher | Teacher acts in role of instructor |
| Teacher_as_facilitator | Teacher acts in role of facilitator |
| Program_autonomy | Teacher allows student choice of text |
| Teacher_as_authority | Teacher acts in role of authority figure |
| Object & Goals |  |
| Progress_teacher_check | Teacher collects student daily scores |
| Progress_pos | Teacher expresses positive perception of student progress |
| Progress_neg | Teacher expresses negative perception of student progress |
| Progress_expectations | Teacher expresses progress expectation (to student) |
| Goals_setting | Teacher describes/reinforces student goals |
| Goals_short_term | Teacher focus on short-term reading goals |
| Goals_long_term | Teacher focus on long-term reading achievement |
| Rules          | Description                                                                 |
|---------------|------------------------------------------------------------------------------|
| Routine_strat | Teacher attends to routines around strategy                                   |
| Routine_rules | Teacher attends to routines around explicit rules                             |
| Routine_curr  | Teacher attends to curriculum routine                                         |
| Behavioral_strat | Teacher attends to implicit behavioral expectations                        |

| Tools         | Description                                                                 |
|---------------|------------------------------------------------------------------------------|
| Tech_user     | Issues related to user challenges                                           |
| Tech_hardware | Issues related to hardware challenges                                        |
| TechCurr      | Issues related to curriculum routine challenges                             |
| Strat_prompt  | Teacher prompts student use of strategy                                      |
| Strategy_assump | Teacher assumption of strategy use positive or negative                    |
| Student_Tech_neg | Teacher view of negative student perception of technology              |
| Tech_positive | Positive perception of technology                                            |
| Text_positive | Positive perception of text                                                  |
| Tech_challenge | Challenge with technology use with program                                  |
| Tech_in-school | Teacher description of school-wide technology use                         |

| Administrator Codes | Description                                                                 |
|---------------------|------------------------------------------------------------------------------|
| Student_interact    | Admin interaction with students                                             |
| Teacher_interact    | Admin interaction with teachers                                             |

| Community | Description                                                                 |
|-----------|------------------------------------------------------------------------------|
| Disruptions | Description                                                                 |
| Tech_disruption | Technology issues as disruption in program use                             |
| Time_schedule | School schedule issues disrupts use of program                            |

| Division of Labor | Description                                                                 |
|-------------------|------------------------------------------------------------------------------|
| Admin_as_authority | Admin role of authority figure                                              |
| Admin_as_assessment_ldr | Admin role of assessment authority                                        |
| Teacher_as_facilitator | Administrator regards teacher as facilitator for reading program          |
| Teacher_as_teacher | Administrator regards teacher as instructional aid                          |

| Object & Goals | Description                                                                 |
|---------------|------------------------------------------------------------------------------|
| Goals_long_term | Long-term reading achievement                                               |
| Goals_short_term | Short-term reading achievement focus                                        |

| Rules          | Description                                                                 |
|---------------|------------------------------------------------------------------------------|
| Rules_explicit | Focus on explicit school/classroom rules                                     |
| Rules_behavioral | Focus on behavioral/ implicit rules                                         |

| Tools         | Description                                                                 |
|---------------|------------------------------------------------------------------------------|
| Program_challenge | Achieve 3000 challenges for teachers/students/administrators                |
| Tech_as_teacher | Technology as instructional tool/focus                                        |
| Tech_in-school | School-wide technology use                                                   |
| Tech_positive | Positive perception/statement regarding technology                            |
| Program_positive | Positive perception of program                                               |
| Text_positive | Positive perception/statement regarding text                                 |