Spring 2018

Accelerated Reader Implementation and Student Reading Attitudes

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Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Arts in Education

California State University, Monterey Bay

May 2018

Accelerated Reader Implementation Practice and Student Reading Attitudes

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Abstract

Accelerated Reader (AR) is a widely used program designed to encourage students to read and to monitor their progress (What Works, 2016). Although studies have looked at the extent to which AR impacts student reading attitudes and have concluded that certain methods of program implementation produce negative reading attitudes in students (Thompson, Mahuri, & Taylor, 2008); there is limited research comparing different methods of program implementation. This study set out to quantify the impact of AR implementation practices using a quasi-experimental quantitative research design. In the current study, the reading attitudes of two groups of students, one which received a standard implementation of AR, and one which received a modified implementation of AR, were measured using the Survey of Adolescent Reading Attitudes (Conradi, Jang, Bryant, Craft, & McKenna, 2013). Data were analyzed using both independent and paired samples t-tests. The results of this study showed diminished attitudes to reading on two of the subscales for both the control and treatment groups, and statistically insignificant results on all other subscales; demonstrating no evidence for the effectiveness of the intervention. Future studies should be conducted over a longer period of time and with a larger sample size to attempt to produce statistically significant results.

Keywords: Accelerated Reader, attitudes, reading intervention

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Accelerated Reader Implementation Practice and Student Reading Attitudes

Literature Review

Currently, California is facing a crisis of low reading scores for high school students. This is supported by state testing data, which show that of the 444,860 11th graders in California tested in 2017, only 34.03% scored above standard for reading; whereas 44.65% scored near standard and another 21.32% scored below standard ("Smarter Balanced assessment test results," 2017). The Smarter Balanced Assessment Consortium (SBAC) produces the state testing for California, the California Assessment of Student Performance and Progress (CAASPP). The test is an online, three-part summative assessment designed to align with the Common Core State Standards (Zhang & Kang, 2017). The test was created to address the perceived lack of scientific standards in No Child Left Behind era testing, and uses multiple question types and computer-adaptive technology (Zhang & Kang, 2017). The CAASPP defines above standard as an ability to understand highly complex texts, and near and below standard as the ability to understand moderately complex texts, and no ability to understand moderately complex texts, respectively ("Understanding California Assessment," 2017).

The results of the CAASPP have implications for students and for schools. For example, the California State University (CSU) uses results of the CAASPP to determine if students are college-ready, and either exempts students from certain remedial classes, or requires remedial classes ("Your guide to college readiness," 2017). Only students who exceed the standard are fully exempt from the CSU Early Start Program, meaning that a student who scores lower may have to enroll in extra classes to become college-ready ("Your guide to college readiness," 2017). Reading performance is just one component of the English CAASPP, the others being writing, listening, and research; however, the reading performance standard has the highest

percentage of students scoring below the standard ("Smarter Balanced assessment test results,"

2017). Since reading is one of the biggest indicators of students' success later on in life (Smart et

al., 2017), it becomes essential that school districts find ways to increase students' reading

achievement. Student performance on standardized reading tests is important insofar as those

tests have consequences for student college admissions, but school districts that want to improve

reading levels in their students need to look at factors not tested by high stakes tests. One such

area that school districts must explore if they want to increase student reading achievement is

student reading attitudes.

Adolescent Attitudes to Reading

Student attitudes towards reading have an impact on students' active pursuit of reading,

as well as their overall success in reading. On one hand, McKenna, Kear, and Ellsworth (1995)

found that students with lower reading abilities had more negative attitudes to reading than their

peers with higher reading abilities. However, this effect also works the other way: negative

attitudes to reading also create barriers to reading, and therefore to reading practice, because it

limits student engagement, and causes students to forgo reading when other entertainment

options are available (McKenna et al., 1995). Practice in reading is important because it has a

positive impact on a student's ability to read (Stanovich, 1986). In particular, the more a student

reads the stronger reader he/she becomes (Cipielewski & Stanovich, 1992; Zebroff & Kaufman,

2017); thus, it is imperative that school districts find ways to help students practice reading.

Furthermore, attitudes to reading fostered in late adolescence tend to remain constant into

adulthood; a student who develops a negative attitude to reading during adolescence is likely to

retain that attitude as an adult (Smith, 1990). Therefore, school districts should seek to employ

programs that enhance student reading attitudes; however, districts must also be vigilant in their

evaluation of said programs to ensure that the programs are indeed promoting positive reading attitudes. One such program, used at the researcher's school, is the Accelerated Reader (AR) program.

Accelerated Reader

To address student reading proficiency, reading programs like AR, a points-based reading and comprehension monitoring system, have been adopted by school districts (What Works, 2016). AR is an electronic reading monitoring system. It has a catalogue of novels which are assigned a point value, and a system of multiple choice tests for each of the novels which assess student reading comprehension. AR also assigns novels a difficulty level. Teachers and students are able to use the system to first locate books that are at an appropriate reading level for a student, and then test a student's reading comprehension of a specific book (What Works, 2016). The problem is that while AR offers schools a great deal of tracking and performance data, the program has been found to negatively impact students' reading attitudes (Smith & Westberg, 2011; Thompson, Madhuri, & Taylor, 2008).

The literature surrounding AR is broad and contradictory. Several studies have found that students disliked AR when implementation practices include punitive grading, lack of choice, and lack of time to read, and that such practices led to cheating and increased stress (Krashen, 2002; Smith & Westberg, 2011; Thompson et al., 2008). Additionally, Solley (2011) found that Renaissance Learning's (i.e., the creator of AR) own official position is to not use AR to determine a student's academic grade; however, it is reflected in multiple studies that some schools calculate academic grades using AR points (Smith & Westberg, 2011; Thompson et al., 2008), which goes against the design and intention of the program.

Further, a study commissioned by AR's publisher found that AR had an overall positive impact on student reading attitudes (Clark, 2014). However, that study was non-experimental, and did not look at *how* AR was implemented, only *if* AR was implemented. Therefore, research is inconclusive on whether AR is an effective reading program in improving students' reading attitudes. The reality is that individual teachers' implementation practices of AR can differ from what is recommended by Renaissance Learning (Solley, 2011); thus, drawing conclusions on its efficacy is nearly impossible.

Although the literature on AR points in different directions, Solley (2011) asserts AR is just a tool, and like any tool its usefulness is largely user-dependent. Understanding what the tool is for, and how to use the tool correctly, is conditional for successful operation. There are many ways a teacher can use the program which result in undesirable outcomes. Thompson and colleagues (2008) summarize the main ways they found AR to be misused as follows: the amount of reading assigned over a given length of time was unrealistic, the book selection was limited, and points were tied to grades, which increased student stress. Furthermore, students who experienced the aforementioned implementation practices of AR had negative feelings about both the program and reading in general (Thompson et al., 2008). This is a problem because negative attitudes to reading can impede reading practice, which stalls student growth (McKenna et al., 1995; Stanovich, 1986). Moreover, the implementation described by Thompson and colleagues (2008) goes against the guidelines set out by AR's publisher (Solley, 2011).

Ineffective implementation of AR. AR is a program that uses points to determine the difficulty and length of a book, and teachers may assign point targets for students to reach (What Works, 2016). Students reach these targets by passing multiple choice tests on books. One problem with points occurs when teachers are at liberty to assign whatever number of points they

want. That point value may end up being too high, discouraging students from reading (Thompson et al., 2008). In their study, Thompson and colleagues (2008) found that one student in their study had to get 71 points, the equivalent of reading *Anna Karenina* (an 864-page novel), while other students had to read far less. The net impact of high point reading requirements is that students feel forced, rather than encouraged, to read, which can negatively impact their reading attitudes. Students who were required to acquire a high point value developed negative reading attitudes, and reading attitudes shifted from generally positive to negative (Thompson et al., 2008). This is important because, as noted above, negative attitudes to reading lead students to choose not to read, which has a negative impact on their practice time, leading to lower reading levels (McKenna et al., 1995; Stanovich, 1986).

In addition to high point requirements becoming burdensome for students, Cregar (2011) stated that the point system itself can lead students away from books they might naturally gravitate towards, and in the direction of books that offer higher point values regardless of interest level. For example, students may select books that are longer, but of a lower reading level, because book length generally correlates to point value. Although no studies have specifically examined choosing a book based solely on its AR point value, this is an important consideration when thinking about students' reading attitudes; particularly as research shows that student interest plays a pivotal role in reading attitudes (Springer, Harris, & Dole, 2017). In classrooms that have high point requirements, students have an incentive to choose the book that fulfills their point requirement (Cregar, 2011).

Another issue with the way AR is used is when AR point accumulation is tied to students' academic grades. When teachers attach an academic point value to AR point accumulation, it devalues the act of reading and increases student stress (Smith & Westberg,

2011; Thompson et al., 2008). This added stress can negatively impact students' reading attitudes, making them more prone to dislike reading and subsequently stop reading. Thompson and colleagues (2008) reported that assigning academic grades for AR negatively impacted student attitudes toward the program, and the practice of assigning academic grades to AR points was simply unfair. Students felt that the program, used in this way, was punitive. Interestingly, Solley (2011) articulates that the official recommendation from AR's publisher, Renaissance Learning, is to never couple AR points to an academic grade. According to Solley (2011), AR points should, at the very most, positively impact a student's grade via extra credit; however, a student's letter grade should never drop as a consequence of not completing an AR goal. The stress of high point-value requirements coupled to academic grades is compounded when students are not given class time to read their novels (Thompson et al., 2008). Though AR has many issues, documented above, there are strategies teachers can use to more effectively implement the program.

AR Efficacy

For AR to work properly, teachers need to pay attention to how they implement the program (Solley, 2011). Three practices that can impact AR implementation are grading practices, student choice of reading material, and the devotion of class time to individual reading. These three practices remove barriers to students sitting down and reading a book for its own sake. A fourth consideration, training for teachers, also needs to be taken into account because AR is a complex program, and teachers will not intuitively implement the program absent proper training.

Grading practices. One implementation practice which can negatively impact student attitudes to reading is the use of AR as a high stakes assessment (Smith & Westberg, 2011;

Solley, 2011; Thompson et al., 2008). As stated above, when AR is tied to grades, students develop negative attitudes to reading (Smith & Westberg, 2011; Thompson et al., 2008). One change teachers can make which addresses a concern outlined above is to decouple academic grades from AR points (Solley, 2011). Solley (2011) argues, in defense of AR, that in the official Renaissance Learning guidelines, it is explicitly stated that AR should never be used punitively. Using AR in such a way as student grades have the possibility to drop as a result of noncompliance is a misuse of the program and against the intensions of the program creators (Solley, 2011). Indeed, Solley's (2011) assertion is reflected in Smith and Westberg (2011), who found that students disliked the added pressure of letter grades, and that a points-based system increase the likelihood of cheating behavior. Another practice that can impact AR's implementation is student choice.

Student choice. Students need to be able to choose what AR book they want to read from a wide selection. Gambrell (1996) writes that student choice is important in students becoming motivated to read. In one study, 80% of students who most enjoyed the book they were reporting on had self-selected that book, but in another, only 10% of students reported liking a book assigned by a teacher (Gambrell, 1996). Choice and students' attitudes to the books they read matter to AR program efficacy: choice is linked to greater engagement (Turner & Paris, 1995), and engagement in reading is a primary goal of the AR program (Solley, 2011; What Works, 2016). When AR is used in schools, student choice is impacted by limiting factors such as small library size (Smith & Westberg, 2011). An additional restriction on student choice comes from the theorist Lev Vygotsky: the Zone of Proximal Development (ZPD). In brief, Vygotsky theorized that there is a level of difficulty in any instruction within which students are challenged sufficiently to promote growth, but not so much so that the work becomes incomprehensible and

counterproductive to learning (Vygotsky, 1978). AR's publisher subscribes to Vygotsky's theory

to the extent that they provide a numerical value, representing a range of reading levels, to

teachers, recommending books of appropriate difficulty for specific students (What Works,

2016). These ZPD scores are used to guide student book selection (What Works, 2016). This, in

turn, limits student choice in reading materials by taking a limited library, and then giving

students access only to a cross-section of it (Cregar, 2011). This all matters because AR, being at

its core a finite library of reading comprehension tests, is inherently limited (What Works, 2016).

Any limit a teacher employs in his or her implementation of AR is a barrier to students selecting

books they actually want to read, impacting the amount they enjoy what they read (Gambrell,

1996), and their engagement with reading itself (Turner & Paris, 1995). But, in the lives of

students, choice is not the only barrier to reading: another barrier is having the time to read.

   In-class reading time. Teachers need to provide the opportunity for students to read their

AR books during class time. Thompson and colleagues (2008) found that students were

frustrated by a lack of in-class reading time. Students in their study became frustrated because

they were expected to read a great deal, but did not have time or space outside of school to do so.

Students discussed home environments that were inappropriate (e.g., very noisy) for reading, and

legitimate obligations (e.g., jobs and child care) which make reading at home difficult

(Thompson et al., 2008). Gambrell (1996) found similar sentiments in the students she

interviewed: students wanted more time to read, and in particular, more in-class time.

Furthermore, to implement AR without giving students class time to read is to go against the

guidelines of the program (Renaissance Learning, 2016). This is important for two reasons. First,

poor implementation means that it is not possible to tell if AR is truly working as a program

(Solley, 2011). Second, this implementation led students to develop bad attitudes to reading

itself, not just AR (Thompson et al., 2008), and students with poor attitudes are less likely to read (McKenna et al., 1995). Differences in implementation, and moreover, the adoption of ineffective practices, could be addressed by training teachers to implement the program properly.

Training for teachers. Though Renaissance Learning does not recommend the tying of academic grades to AR points, the practice is noted in multiple places (Smith & Westberg, 2011; Solley, 2011; Thompson et al., 2008). Additionally, teachers use components of AR to limit student choice (Cregar, 2011). In-class reading time is given in some cases (Smith & Westberg, 2011), but not in others (Thompson et al., 2008). Inconsistency in practice, and the establishment of best practices, could be solved by proper training. Thompson and colleagues (2008) note that lack of training may lead to the inconsistent results seen in different studies of reading programs. Solley (2011) found that untrained teachers engaged in practices which would decrease the effectiveness of the program. For example, Solley (2011) found that untrained teachers were using unfair, punitive grading scales when assessing students with AR quizzes. This is a practice explicitly addressed at Renaissance Learning's training seminars—training, in other words, would have prevented this situation (Solley, 2011).

Conclusion

According to the literature, it should not be taken for granted that implementing AR is intuitive; instead, best-practices need to be established and teachers using the program need to be trained (Solley, 2011). The literature provides a starting point to address the implementation of AR to efficacy, but is not complete. While there are various studies on the effectiveness of AR, and various studies on how AR can be used correctly, there is not much comparative data that looks at the difference in student attitudes between different implementation practices.

The purpose of the present study is to collect quantitative data to support a finding from

Thompson and colleagues' (2008) qualitative study on AR. Thompson and colleagues (2008)

found, in interviewing high school students, that various implementation practices—notably, too

many points assigned, punitive grading practices, limited time to read in class—contributed to a

negative attitude not just to the program, but to reading itself. These findings are troubling

considering the impact negative attitudes to reading have on reading practice (McKenna et al.,

1995) and the tendency of adolescent attitudes to reading to solidify into adulthood (Smith,

1990). However, because Thompson and colleagues (2008) used qualitative methods in their

study, it is not possible to determine a causal relationship between AR implementation practices

and student reading attitudes. In this study, by using AR implementation practices described

earlier and comparing that implementation to a conventional AR implementation, the researcher

hopes to collect data which supports or refutes the anecdotes from earlier research (e.g.,

Thompson et al., 2008)

Methods

Research Question

To what extent do non-punitive grading practices, open reading options, and in-class

reading time, when used to implement the AR program, impact 11th grade students' reading

attitudes?

Hypothesis

Based on the findings of Thompson and colleagues' 2008 study, the researcher

hypothesized that removing grades as a factor in AR would result in students in the experimental

group having an increase in positive attitudes to reading.

Research Design

The present study employed a quantitative non-equivalent groups pretest-posttest design. During the first week of the intervention, both groups were administered the Survey of Adolescent Reading Attitudes (SARA; Conradi et al., 2013). The treatment group received the intervention over the course of three weeks. The control group received a "conventional" implementation of AR, characterized by AR points being used to calculate academic grades, student choice limited to the AR library, and no class time devoted to independent reading. After the grading period concluded, SARA was re-administered as a posttest for both the control and treatment group, and the results of the tests were compared.

Independent variable. Conceptually, the independent variable was defined as the use of AR, using that program's guidelines for implementation. The independent variable made specific changes to the implementation practice as outlined in Solley (2011). The students received class time to read independently, AR points did not count toward an academic grade, and students were given free choice of what book they wanted to read (Solley, 2011).

Dependent variable. Conceptually, the dependent variable was defined as students' enjoyment of reading across two purposes, academic and recreational, and in two mediums, print and digital (Conradi et al., 2013). These two categories, purpose and medium, formed a matrix comprised of four subcategories: Academic-Print (AP), Recreational–Print (RP), Academic-Digital (AD), and Recreational-Digital (RD; Conradi et al., 2013). Examples of AP included reading a print textbook and writing in a notebook; examples of AD included web-based research and image searches; examples of RP included reading a print novel and reading a print comic; examples of RD included reading a digital novel, but also reading less formal sources like Facebook and popular websites (Conradi et al., 2013).

Operationally, the dependent variable was defined as student attitudes to reading as measured by SARA (see Appendix A), with responses on a six-point Likert scale ranging from *6 = Very Good to 1 = Very Bad* (Conradi et al., 2013). The 18 questions were linked to four subscales described above: AP, AD, RP, and RD (Conradi et al., 2013).

Setting & Participants. The setting for this study was a central California public high school with a population of 2,800 students. Demographically, the students are 67.1% Hispanic, 24.1% white, 2.8% Asian, 2.1% Filipino, and 1.3% Black or African-American (SARC, 2016). This study used two groups of 28 students: a treatment group and a control group. Both groups were selected using a mixture of convenient and cluster sampling—that is, both groups represent naturally occurring clusters within the school.

Treatment group. The treatment group consisted of 28 students in the 11th grade in the researcher's third period class. Eleven of the 28 students have Individualized Education Plans (IEPs); 5 of the students are English Language Learners (ELLs); there are 13 boys and 15 girls.

Control group. The control group was made up of 28 students in the 11th grade in the researcher's 1st period class. This class of 11 boys and 17 girls has five students with IEPs and three ELLs.

Measures. The measure used was SARA, which was developed specifically for measuring attitudes to reading (see Appendix A). SARA divides adolescent attitudes into reading on four subscales: Academic-Print (AP), Academic-Digital (AD), Recreational-Print (RP), and Recreational-Digital (RD; Conradi et al., 2013). SARA is 18 questions long, and each of the subscales has multiple questions associated with it (Conradi et al., 2013). To prevent the occurrence of a response set, questions related to each subscale have been intermingled (Conradi et al., 2013).

Validity. McKenna, Conradi, Lawrence, Jang, and Meyer (2012) established construct validity by interviewing students to determine if students' interpretations of the survey questions were consistent with the interpretations intended by the researchers. In one case, the students interviewed misread a question about graphic novels to be novels about sex, rather than the intended interpretation of comic books (McKenna et al., 2012). This question was eliminated (McKenna et al., 2012). Finally, McKenna and colleagues (2012) conducted factor analysis and computed reliability coefficients, and found evidence that SARA was both valid and reliable (McKenna et al., 2012).

Reliability. The researchers calculated using Cronbach's alpha and found that the consistency coefficient for all subscales was above .70 (ranging from $\alpha = .76$ to $\alpha = .86$) for each of the four subscales (Conradi et al., 2013). The overall reliability, calculated using McDonald's ω_h was .96 (Conradi et al., 2013).

Intervention

The intervention for this study was the implementation of the AR program using the procedures recommended by AR's publisher (Solley, 2011). The intervention was different from standard practice at the researcher's site in the following ways. First, students' academic grades were fully divorced from the AR system; no performance or behavior measured by AR made its way into the intervention gradebook (Solley, 2011). Secondly, students were given the option to pick any book they wanted to read. In other implementation practices, students needed to pick books of a certain length (measured by "points") or pick books of a certain level, measured by AR's internal reading level scale (Solley, 2011). Finally, students were given one class period per week to read in class. These independent variables had the most impact on student attitudes in previously conducted research, and represented departures from the intended use of the

program. (Solley, 2011; Thompson et al., 2008). After the four-week intervention, the researcher measured changes in reading attitudes as assessed by SARA.

Procedures

The study commenced at the beginning of a grading period. Two eleventh grade English classes, one third period and one first period, were administered SARA (Conradi et al., 2013). The purpose of this study was not announced to either group, as doing so would almost certainly impact the results of the survey, due to participants' possible desire to influence the school's use of AR. It should be noted that the researcher did not wish to discount student voices when choosing a reading program; rather, the researcher wanted to eliminate a variable which could impact the results of this specific study.

Following the initial survey, the treatment group started receiving the intervention. It was explicitly announced to the intervention group that AR no longer counted for a grade, that any book could be read for AR, and that 45 minutes of sustained silent reading time was to be given to students on every Wednesday of the intervention period. These procedures were in effect until the end of the grading period, when SARA was administered for a second time.

The control group followed the "standard" AR procedures: AR impacted students' grades, no in-class time for reading was given, and books needed to meet length and difficulty requirements. Those students also retook SARA at the end of the grading period. Data was collected at the beginning and end of the three-week intervention.

Fidelity. In order to ensure that this study was completed to fidelity, the following steps were taken. There was a Special Education co-teacher who was present 100% of the time during third period; that co-teacher was able to ensure 100% fidelity to the intervention. The co-teacher acted as an impartial observer to ensure that the researcher followed the intervention

consistently. The co-teacher was in the class daily; weekly the co-teacher filled out a fidelity checklist that asked questions about the three components of the intervention: student choice, grading, and class time for reading (see Appendix B). Because the co-teacher was in the classroom 100% of the time, she knew the answers to the questions based on her observations of interactions between the researcher and his students. Additionally, the co-teacher interviewed students at random to make sure they were all given the same intervention. The co-teacher was present every day, but filled out the checklist only once a week, or 20% of the total time of the study.

For the control class, a teacher-coach observed the room three times during the three-week intervention to ensure fidelity. This teacher was not in the classroom 100% of the time; he instead visited the classroom on Wednesdays and on a Friday, for a total of three sessions. That teacher looked to make sure the three components of the intervention detailed above were not in practice in the control classroom. This was done in two ways: first, by observing that class time was not being devoted to reading, and second, by interviewing students at random to make sure that reading happened at home and not at school, that AR tests were included in student grades, and that book selection was limited.

Ethical Considerations

The sample used in the study contained participants from vulnerable populations. Specifically, the sample contained minors and students with disabilities. It was important for the researcher to omit all potentially identifying information from the research to protect participants' rights. Furthermore, students in the treatment group received less instructional time than students in the control group, while students in the control group received no school time designated for reading. Although the treatment group received less instructional time, the impact

of the intervention on student reading was considered more important for the students' overall academic achievement. Thus, this ethical consideration was not considered to be harmful to participants.

Further, students in the control group who did not wish to read were academically penalized; however, this academic penalty did not exceed the current guidelines adopted by the English Department at the study's location. The control group received an implementation of AR that was consistent with the practices adopted by the English Department. If the treatment was found to be beneficial, it would benefit all participants, as the intervention could easily be applied to the control group. Thus, after examining the results of the current study, if the intervention had been successful it could also have been implemented in the control group classroom. Additionally, the intervention's duration of three weeks meant that, at its conclusion, there was time for students to make up their grades before the semester ended and grades were finalized. Thus, no students were ultimately penalized for participating in either the treatment or control groups.

Validity threats. The first major threat to the validity of the research is the researcher's own bias against the AR program. Over the course of a year, the researcher has read material that is by and large in direct opposition to AR. Additionally, the researcher is not in complete agreement with the English Department's facilitation of the AR program and has come to the conclusion that his colleagues are implementing AR in a way which negatively impacts students.

To mitigate this potential validity threat, the researcher avoided all conversations with colleagues concerning AR during the study, did not participate in any policy decision regarding the implementation of AR during the course of the study, and did not discuss his attitudes to AR with his students during the course of the study. Additionally, the researcher remained cognizant

of any bias he may have held during the discussion section and worked to achieve an objective

tone. Moreover, having an independent observer in the room for fidelity to intervention ensured

that researcher bias did not impact the current study.

Data Analyses

All data were entered into the Statistical Package for the Social Sciences® (SPSS®) for

Windows, version 24.0.0 (SPSS, 2016). No names or identifying information were included in

the data analysis. Before analyses were conducted all data were cleaned to ensure no outliers

were present (Dimitrov, 2012). During data collection, five students were absent from the control

group, and five students were absent from the treatment group, and missed at least one of the

administrations of SARA. Therefore, 10 students were removed from the study. After cleaning

the data, independent and paired samples t-tests were conducted to determine the significant

difference in reading attitudes between the two means of the pretest and posttest scores on

SARA. Further, before interpreting the analytical output, Levene's Homogeneity of Variance was

examined to see if the assumption of equivalence was violated (Levene, 1960). If Levene's

Homogeneity of Variance was not violated (i.e., the variances were equal across groups), data

was interpreted for the assumption of equivalence; however, if the variances were not equal

across groups the corrected output was to be used for interpretation.

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Results

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Independent samples t-tests were conducted for each of the four subscales on SARA for

the whole sample ($n = 46$) for both pre and post assessment scores. SARA's subscales for

adolescent attitudes are: Academic Print (AP), Academic Digital (AD), Recreational Print (RP);

Recreational Digital (RD; Conradi et al., 2013). Results for the pretest were: Levene's

Homogeneity of Variance was not violated ($p < .05$), meaning the variance between the groups

was not statistically significant and no correction was needed, and the t-tests showed non-significant differences between the mean scores on the pretests between the two groups. This means that the two groups had comparable attitudes to reading at the start of the study and could be used in analysis without concern for any of the subscales (see Table 1). Results for the posttest were: Levene's Homogeneity of Variance was not violated ($p > .05$), meaning the variance between groups was not statistically different and no correction was needed and the t-test showed non-significant differences between the mean scores on the posttests between the two groups for all but two of the subscales: AP for the treatment group and AD for the control group ($p < .05$). However, the means of those two subscales decreased indicating a decrease in positive attitudes towards reading. Therefore, the lack of significant difference on the majority of the subscales for reading attitudes, and the decrease in the mean for the two subscales with a significant difference, provided little support for the effectiveness of the intervention.

After determining the differences between pre and post assessment scores between groups, paired t-tests were run for both groups (i.e., treatment and control) on each of the subscales to determine if participants' mean scores from pre to post were significantly different within each group (See Table 2.) Only the t-tests for two of the subscales, AP for the treatment group, and AD for the control group, were statistically significant ($p < .05$). However, both of those subscales showed a drop in the mean score, indicating that the researcher was unable to achieve the hypothesized results. This may have happened because the intervention itself was ineffective, especially over a three-week timeframe.

Table 1

Results of Independent Samples T-Tests

SARA Subscales	Mean	SD
Pretest Academic Digital		
Control	4.10	.87
Treatment	4.09	.85
Posttest Academic Digital		
Control	3.94	1.04
Treatment	3.83	.89
Pretest Academic Print		
Control	3.30	.90
Treatment	3.52	1.01
Posttest Academic Print		
Control	3.36	1.01
Treatment	3.16	1.08
Pretest Recreational Digital		
Control	5.04	1.10
Treatment	5.04	1.11
Posttest Recreational Digital		
Control	4.75	1.25
Treatment	4.81	1.21
Pretest Recreational Print		
Control	3.69	1.35
Treatment	3.81	1.31
Posttest Recreational Print		
Control	3.73	1.31
Treatment	3.66	1.35

Note. SD = Standard Deviation

Table 2

Results of Paired T-Tests

SARA Subscales	Mean	SD	t	Sig.
Academic Digital				
Control	.17	.56	1.42	.17
Treatment	.27	.68	1.88	.07
Academic Print				
Control	-.06	.86	-.32	.76
Treatment	.37	.77	2.26	.03*
Recreational Digital				
Control	.29	.61	2.30	.03*
Treatment	.23	.77	1.45	.16
Recreational Print				
Control	-.05	.88	-.29	.78
Treatment	.15	.78	.90	.38

Note. SD = Standard Deviation. *t* = T-Value. Sig. = Calculated Probability. * = *p* < .05.

Discussion

The purpose of this study was to determine the extent to which AR implementation practices impacted student attitudes towards reading. AR is widely used in schools (What Works, 2016), so the extent to which it impacts student reading attitudes is important; especially considering students' reading attitudes impact students' reading ability (McKenna et al., 1995). Multiple qualitative studies found students expressing negative attitudes to reading when AR implementation included letter grade penalties for failing to read and limited time to read in class (Smith & Westberg, 2011; Thompson et al., 2008). However, those studies did not quantify student reading attitudes, so there is no way to determine from them the effect size of different AR implementation practices. Additionally, Thompson and colleagues (2008) did not compare AR implementation practices; instead, they looked at one practice model at one school. This study sought to quantify previous qualitative research and determine if changing certain implementation practices had any impact on student reading attitudes.

In order to quantify the impact of AR implementation on student reading attitudes, two classes, one assigned to be the control, the other assigned to be the treatment, were administered a three week session of AR. The control group received an implementation that is consistent with current practices and English department agreements at the researcher's site. These practices included assigning letter grades based on AR points earned, requiring a set number of points, limiting book selection to the AR library only, and limiting in-class time for reading. The treatment group received an implementation consistent with previous research (Solley, 2011; Thompson et al., 2008). This practice included weekly in-class reading time, free selection of books regardless of the length and point value, and no academic penalty for not reading. The study took place over the course of three weeks, with SARA being administered at the beginning and end of that period.

The purpose of administering SARA to was quantify the extent to which different implementation practices of AR impacted student reading attitudes. SARA is divided into four subscales and can be interpreted in the following way: with responses ranging from 1 (the least positive) to 6 (the most positive), any number above 3.5 indicates a positive attitude to reading (Conradi et al., 2013). Ultimately, only two subscales yielded statistically significant data: the control group saw a decline in RD from 5.04 to 4.75, and the intervention group saw a decline in AP from 3.52 to 3.16. The intervention group's drop on the AP subscale does not support what previous research showed about AR implementation and student attitudes (Thompson et al., 2008). Though the intervention group received an implementation of AR which removed factors identified as having a negative impact on student attitudes (Smith and Westberg, 2011; Thompson et al., 2008), that group nonetheless saw a significant drop on the AP subscale. Additionally, the conclusions drawn by Renaissance Learning's own research are not supported:

students in that study saw average increases in positive attitudes to reading (Clark, 2014). Students in this study, both in the control and intervention groups, experienced drops in attitudes to reading.

One explanation for these findings is that AR, especially over a short timeframe, does not dramatically impact student attitudes. On three of the four subscales for the control group (i.e., AD, AP, and RP) and on a different three of the four subscales for the treatment group (i.e., AD, RD, and RP) there was no significant change in attitudes measured. This makes sense when considering that AR, as it was implemented in the study, is a relatively subtle intervention. Students read to themselves, chose their own books, and made the time (or did not), to read at home. AR is a tool which holds students accountable and provides them feedback on the quality of their reading, but AR does not actively change the process of reading. Furthermore, it is possible that, despite findings by previous researchers (Thompson et al., 2008), the practices of grading or not, of reading in class or not, and of getting points or not, do not matter to students as much as they say.

Another possible explanation for the results, especially for the intervention's drop in AP, is all of the other reading students are asked to do in class. This year, the English departments in the researcher's district adopted a new curriculum. Among other things, the curriculum emphasizes the reading of challenging texts. During the study, the researcher noticed more complaints about the fatiguing nature of in-class readings. These readings were all academic nonfiction, in print, all at grade level, and had to each be read multiple times for the purpose of analysis. This type of reading was not part of the study, but could have impacted students' attitudes, particularly on the AP subscale. While these explanations may give insight into the results of the study, there are a number of important limitations to consider.

Limitations and Future Directions

The single most important limitation in the study was time. The AR program, which is designed to be used consistently throughout the school year, was ultimately pared down to a three-week intervention. This was because of time constraints outside the researcher's control. Students in both the control and intervention groups had time to finish reading their books, but the timeframe was insufficient to see long term changes in student attitudes based on changes to AR. It is possible that there would have been greater changes in students' attitudes if the study had been conducted over a longer timeframe. Therefore, future studies should begin at the start of a school year, and end either at the end of the semester or the end of that school year. This would give future studies more time to implement the intervention, and more time for the intervention to take effect.

Additionally, sample technique and sample size were also limitations. Because the research took place in a real classroom, a convenience sample had to be used. Though the researcher selected his two most comparable classes, and Levene's Homogeneity of Variance was not violated, the two classes were different in terms of population, with the intervention class containing more Special Education students than the control class. Additionally, the sample size was small. Both classes started with 28 students, but due to high absenteeism at the researcher's school, five students from each class missed one or both of the attitude surveys and were removed from the results. The size of the sample makes it impossible to generalize the results of this study. Future studies should seek out entire school sites or districts willing to participate. Due to the fact that the intervention involves changes to class time and grading policies, it will never be possible to use a true random sample in a replication of this study. Nonetheless, a significantly larger cluster sample would help to mitigate variables such as

absenteeism, and students' initial reading ability, which has been shown to have an impact on student reading attitudes (McKenna et al., 1995).

Finally, time of year was a limitation. This study was conducted in the fourth quarter of the school year; at that point, students had been reading in various capacities for eight months of the school year. Their level of fatigue with school in general, and reading in particular, was higher than it would have been if the study had been conducted in the fall. In future studies, this could be mitigated in a number of ways. The study could be moved to the beginning of the school year, steps could be taken at the school site to minimize or remove concurrent reading interventions (i.e., book clubs, class novels, etc.) which compete with AR for student attention, and SARA could be administered at multiple points throughout the school year, rather than just at the beginning and the end of the intervention, in order to account for time-of-year effects.

Future studies should take all of these limitations into account. AR needs to be studied over a long period of time to see how it impacts students' attitudes to reading. Future studies could be held over a semester or even a year. This would allow more time for the intervention to take effect, and would reduce the effects of time-of-year variables like state testing, spring break, and general fatigue. Furthermore, future studies would benefit from large, random samples. Taking all the students in a district that uses AR, for example, and creating a random sample within that cluster, would yield better results than two small convenience samples. This would also reduce the effects of factors like Special Education status and students' attitudes to their teachers.

Ultimately, although the results of this study do not agree with the findings of Thompson and colleagues (2008), the limitations of this study mean that the results do not disprove previous research, either. Reading attitudes remain an important metric in student reading achievement

due to the impact reading attitudes have on reading practice (McKenna et al., 1995), and the importance of practice to overall achievement (Cipielewski & Stanovich, 1992; Stanovich, 1986; Zebroff & Kaufman, 2017). Because of this, interventions designed to improve students' reading ability should also improve students' reading attitudes. AR could be the system to address both skill and attitude, but more research is needed, using a random sample and longer intervention period, to determine the impact of implementation practices on student reading attitudes. Therefore, when implementing reading programs in their classrooms, teachers should pay attention to student attitudes to reading, either through qualitative interviews, or quantitatively, with a measure such as SARA.

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Appendix A

Survey of Adolescent Reading Attitudes

How do you feel about reading news online for class?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about reading a book in your free time?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about doing research using encyclopedias (or other books) for a class?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about texting or emailing friends in your free time?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about reading online for a class?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about reading a textbook?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about reading a book online for a class?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about talking with your friends about something you've been reading in your free time?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about getting a book or a magazine for a present?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about texting your friends in your free time?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about reading a book for fun on a rainy Saturday?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about working on an internet project with classmates?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about reading anything printed (books, magazines, comic books, etc.) in your free time?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about using a dictionary for class?	(Very Good) 6	5	4	3	2	1 (Very Bad)
How do you feel about using social media like Facebook or Twitter in your free time?	(Very Good) 6	5	4	3	2	1 (Very Bad)

How do you feel about looking up information online for a class?	(Very Good) 6 5 4 3 2 1 (Very Bad)
How do you feel about reading a newspaper or a magazine for a class?	(Very Good) 6 5 4 3 2 1 (Very Bad)
How do you feel about reading a novel for a class?	(Very Good) 6 5 4 3 2 1 (Very Bad)

Appendix B

Fidelity Checklist

Intervention Classroom
Please answer 'yes' or 'no' to each of the questions.

Please date here.						
Are students given class time to read their books?						
Are students allowed to select any book they want to read?						
Are students' grades calculated using AR tests scores?						
Please initial in the following box for the current date.						

Name: _____ Signature: _____ Date: _____

Control Classroom
Please answer 'yes' or 'no' to each of the questions.

Please date here.						
Are students given class time to read their books?						
Are students allowed to select any book they want to read?						
Are students' grades calculated using AR tests scores?						
Please initial in the following box for the current date.						

Name: _____ Signature: _____ Date: _____