

Fidelity of Implementation of
Istation Reading:
Sixth Grade through Eighth Grade



UNIVERSITY OF
CENTRAL FLORIDA



Istation

Research Project Title:

Istation Fidelity of Use: For Grades 6-8

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***Note:** This report is complementary to the report titled "*Fidelity of Implementation of Istation Reading: Kindergarten through Fifth Grade*" which details findings for kindergarten through fifth-grade students in the same district. Given that the results are from the same fidelity study, the narrative is predominantly the same.

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Introduction

The following fidelity report documents the implementation of Istation Reading for grades 6-8 in a mid-Atlantic school district. The Research in Innovations in Education group (RIE) conducted observations of assessment and usage procedures of Istation Reading four times over the course of the 2018-2019 school year. These observations took place at two middle schools during the fall semester. All observations were conducted using one of two observation protocols: (a) The UCF Observation Protocol for Istation Assessment and (b) The UCF Observation Protocol for Istation Non-Assessment. Data from a district-wide teacher survey, a teacher focus group, and student usage data supplied by Istation were also used to inform fidelity ratings. The following report provides descriptive and inferential findings related to the fidelity of assessment and implementation.

Fidelity of Implementation:

Fidelity of Implementation is most concerned with “the extent to which the critical components of an intended program are present when that program is enacted” (Century, Rudnick, & Freeman, 2010, p. 202). Considering this definition, the following study was conducted to determine if and to what extent there was fidelity of assessment and usage implementation for the Istation Reading program within a school district in the mid-Atlantic region of the United States.

Century’s (2010) basic *Fidelity of Implementation* framework was adopted to assess the fidelity of implementation and adapted to fit the unique context of technology-based learning. A new component titled “Environment” was added as a structural component since it was apparent that the learning environment inclusive of the technology support was instrumental in contributing to implementation fidelity (see Table 1).

To quantify the data sources, all possible implementation data sources were considered and instruments were developed accordingly. Next, these items were collected over the course of a school year. Finally, these items were assigned to one of the five constructs (see Appendix A).

Table 1

Fidelity of Implementation of Istation Reading

Structural Components			Instructional Components	
Environmental	Procedural	Educative	Pedagogical	Student Engagement

Note. Adapted from (Century, Rudnick, & Freeman, 2010)

Elements Included:

Structural-Environmental Components: Considered within this component is the physical environment where the students engage in the computer-based reading program inclusive of the contextual features that set the stage and form the environmental backdrop for Istation use (e.g., room setup, conditions for learning, and devices).

Data Evidence: Observations (quantitative)

Structural–Procedural Components: The implicit and explicit instructions for use as determined by Istation and by the participating school district’s guidelines (e.g., procedures and guidelines) are procedural components of fidelity. For the purpose of this report, the implicit Istation usage guidelines are 30-40 minutes of curriculum use per week depending on students’ achievement. Further, Istation provides a script that teachers may use to introduce the assessment and communicate expectations for student behavior. Additionally, the district required all schools to have students take a benchmark assessment three times per year.

Data Evidence: Observations (quantitative) and Focus Groups (qualitative)

Structural–Educative Components: Educative components included the training and/or professional development provided to teachers, administrators, and instructional coaches to follow the procedures and guidelines of Istation by the district and by Istation. These components are comprehensive of everything teachers need to know to utilize the program including the language of the discipline, usage guidelines, and how to leverage data to maximize learning. For the purposes of this report, teachers’ access to effective training, knowledge resources, and reported knowledge of how to use Istation features were evidence of structural-educative components.

Data Evidence: Teacher Survey (quantitative) and Focus Groups (qualitative)

Instructional–Pedagogical Components: The pedagogical aspects for fidelity include the way the teachers, instructional coaches, and support staff demonstrate the actions and attitudes related to effective implementation including interactions with the students.

Data Evidence: Observations (quantitative)

Instructional–Student Engagement Components: The student engagement factors were ways students interacted with the Istation Reading curriculum and assessment program.

Data Evidence: Observations, Assessment Usage, and Curriculum Usage (quantitative)

The purpose of this investigation was to determine the fidelity of implementation of the Istation Reading program for grades 6-8 in one mid-Atlantic school district in the United States. The research questions for the study included:

1. To what degree of fidelity is the usage of the Istation Reading program being implemented in grades 6-8 in one school district for assessment and non-assessment use?
2. How is the use of the Istation Reading program for grades 6-8 in the district characterized by the *Fidelity of Implementation of Istation Reading Framework*?

Setting of the Study

County School District Demographics

The county school district serves more than 10,000 students (NCES, 2018). These locations include 13 elementary schools, 4 middle schools, 4 high schools, and a technical learning center. The National Center for Education Statistics (2018) compiled this demographic information from school reports of the 2017-2018 academic year, which includes a subset of 17 schools and more than 9,500 students from the district. Of the reported student population, 62.04% of students identify as White, 18.81% describe themselves as Hispanic, 10.76% identify themselves as Black, and 2.50% identify themselves as Asian. Fifty-one percent of students identify as male, while the remaining 48.76% describe themselves as female. Additionally, 46.28% of the students qualify for free or reduced-price lunch.

School Selection Procedures

All elementary and middle schools were classified by the district into high performing or non-high performing schools. School performance was determined based on the previous year's Deidentified Standards of Learning (SOL) scores. Classified schools were added into a random online generator (pickatrandom.com) and two schools from each category (e.g., high performing and non-high performing) were selected.

Schools were notified that there would be observations during their upcoming benchmarking assessment window. For scheduling purposes, schools were asked to provide teachers' schedules when they intended to have their students complete the October Istation assessment. The majority of schools offered full cooperation by providing the requested schedules. In the cases where schedules were not received and multiple emails and telephone calls were unanswered, the district office was able to facilitate communication. Further, all schools were notified that there would be multiple visits to their schools throughout the remainder of the school year.

Participants

According to fall membership counts conducted by the state's Department of Education (2019), the total possible participants of the study included the 1,566 students at the representative observed middle schools (See Table 2).

Table 2

Enrolled Students

Grade	District Enrolled Students by Grade	Students Enrolled at Schools Observed
Sixth	1,128	547
Seventh	1,071	513
Eighth	1,044	506
Total	3,243	1,566

Observed Schools

The schools where the observations took place were representative of the school district in that one middle school was high performing and the other was non-high performing. The schools represented the geographical locales of the district.

Table 3

School Information

	Title I	Performance	Locale
Middle School A	No	High	Suburb: Small
Middle School B	No	Low	City: Small

The research team visited the district four times over the course of the school year. The third visit had to be rescheduled twice, as the district was closed for inclement weather. The following table represents the number of observations conducted at middle schools by grade and the number of teachers, students, and instructional aids that were present in the classroom during the observations. All averages were rounded to the nearest digit.

Table 4

Observation Visits by Grade

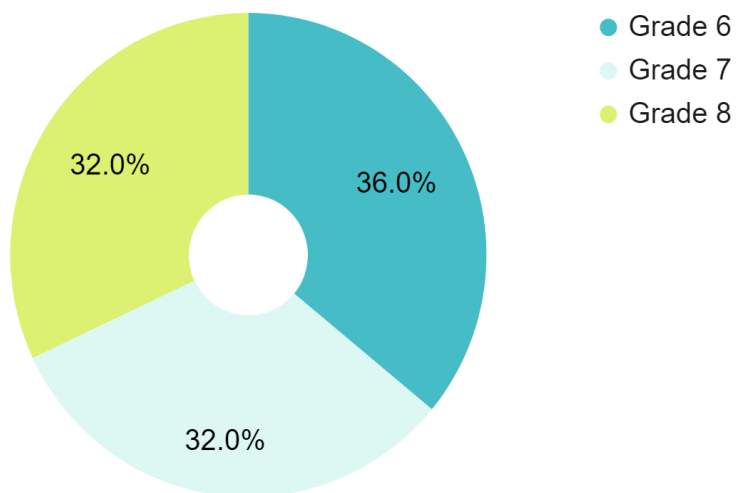
Grade	# of Obs.	Average Students	Teachers ^a	Average Instructor to Student Ratio
6th	9	23	>1	1:23
7th	8	19	1	1:19
8th	8	18	1	1:18

^a Includes substitutes.

The following figure provides the percentages of observations that were conducted by grade.

Figure 1

Percentage of Fidelity Observations by Grade



Contextual Factors

During the observation data collection period, inclement weather contributed to multiple days out of school for students at the end of the second through the third quarter. Many of these days were made up in the fourth semester after observations were conducted. In middle schools, students' usage and assessment compliance during this time was less than 10% of other quarters. Further, there were multiple school days when there were one to two hours of opening delays. In total, the district closed schools for eleven inclement weather days throughout the second and third quarter.

Methodology

Data Sources

Data sources include expert observation (Ruiz-Primo, 2005) using the observation protocols titled *The UCF Observation Protocol for Istation Assessment* and *The UCF Observation Protocol for Istation Non-Assessment*, interviews, focus groups, and usage data. These data sources are described herein.

Observation. Direct observations with highly qualified observers are one of the best ways to conduct a fidelity of implementation study. According to Harn and colleagues (2013), observations should not be a one-time occurrence but rather implementation should be measured multiple times. In this study, there were four visits to the district that took place over the course of the academic year. Two types of observations were conducted: assessment and non-assessment. Assessment observations were those observations that were conducted during monthly and district-prescribed benchmarking reading assessments. The program triggers assessments the first time a student logs into the Istation Reading program, typically at the beginning of each month. Additionally, in this mid-coastal district, there were pre-established benchmarking periods that occurred at other times during the benchmarking month (e.g., scheduled benchmarking through on-demand assessment mid-month). In addition to assessments, Istation Reading also includes adaptive curriculum for growth and enrichment based on students' needs. Observations were guided by two protocols: (a) *The UCF Observation Protocol for Istation Assessment* and (b) *The UCF Observation Protocol for Istation Non-Assessment*.

Notes from open-ended conversations. Conversations occurred spontaneously and informally with principals, literacy coordinators, and other key personnel. Informal notes were recorded. These informal notes were systematically categorized by the implementation area and reviewed to provide contextual nuances throughout this report.

Focus groups. Two focus groups occurred during the spring semester with middle school teachers, a literacy coordinator, and an assistant principal. Informal notes were recorded. These informal notes were systematically categorized by themes after the notes were read and coded. They have provided contextual nuances throughout this report. Two focus groups were conducted with middle-school teachers in the district at their request. One focus group took place in a face-to-face setting and the other was conducted through Skype. After visiting one school (Middle School B) and not observing any use of the program as indicated on the schedule, two lead teachers asked if members of the research team could meet during their planning to discuss how they typically incorporate Istation into learning.

Usage data. Usage data (assessments and curriculum) were obtained from Istation. It is included as a measure of student engagement with the program. For further usage information please consult the Overview and Predictability reports.

Teacher Survey. An online survey was sent to all K-8 teachers ($n = 490$) in the district to measure teachers' perceptions of Istation usage. One hundred and sixty-two or about 33% of the teachers responded. All answers were considered even if all questions were not answered. Teachers were asked to provide their understanding of Istation assessment and curriculum. Several questions were considered as part of self-reported fidelity of implementation and usage (e.g., the use of a script for assessment and use of Istation with students by academic level). Differences

between what was observed and declared by self-report are noted in the discussion. The findings include results from the grades 6-8 teachers ($n = 23$) at the observation schools and all schools in the district.

Fidelity Variables. Fidelity variables that contribute to the *Fidelity of Implementation of Istation Reading Framework* are included in Appendix A.

The Procedure of the Study

First, permissions for conducting research were obtained from the university and respective school district. Next, the district provided categorized school information. Schools were then randomly selected. Letters of introduction and study procedures were sent to all schools where the observations were to take place. Follow-up emails were sent requesting Istation and literacy schedules. All data was collected on paper as Internet access at schools was not guaranteed.

The first round of observations were conducted with two observers each recording their observations. Data was subsequently recorded into Qualtrics. The same procedure was followed for subsequent visits. Schools were notified in advance that observers would be on campus but schools did not know which classes would be visited at what time during the visit. After the close of the school year, a request for Istation data was sent. Additionally, an outside audit was conducted of the paper copies of the observations and recorded digital data. Finally, all data was analyzed and the findings and analysis are contained within this report.

Developing observation protocols. *The UCF Observation Protocol for Istation Assessment* and *The UCF Observation Protocol for Istation Non-Assessment* were used to guide expert observations. The protocols were initially developed from (a) Istation assessment procedures found in the teacher dashboard videos on Istation's website (behind the paywall), (b) a review of the literature regarding observational protocols in K-12 education, and (c) analysis of open-source video of students using Istation.

The literature review to develop the protocol included the following bodies of literature: (a) classroom management protocols, (b) computer-aided instruction observational instruments, and (c) reading observations. After reviewing both Istation's procedures and the literature, an initial observation protocol was developed. Next, the protocol was sent for evaluative purposes to a lead Istation professional development trainer with over 10 years of training experience and five years of using Istation assessments as an elementary school teacher. Her review provided seven main comments. One vital comment included reminding students to press pause before raising their hands. This reminder was added to the protocol. Additional revisions were made to the instrument as needed.

Next, the protocol was sent to two teachers and one administrator for evaluation. These expert reviewers provided critical feedback that was incorporated into the instrument. Next, a small cohort of current teachers acting as content experts ($n = 7$) reviewed the protocol and provided additional clarifications. Finally, version one of the protocols was published for use. Training was developed to qualify observers. Once the protocol was utilized in schools, an additional modification was made to the protocol which included adding additional classroom configurations and a notes section for each question.

Training expert observers. An online interactive training was developed that included an hour-long module with questions and answers related to the protocol and opportunities to practice using the observation protocol. Within the

online module, the purpose and objectives of the observations were established. The training included authentic footage of students using Istation. Procedures and related processes were highlighted as they took place in the video using pop-ups and pauses. Observers were encouraged to take notes on the videos. Next, the observers reviewed the protocol. Then, the potential observers each practiced coding three separate videos of students using the Istation Reading program. The observers could replay any part of the training module and were able to practice coding multiple times. Throughout the training, observers recorded their answers on a Google form.

Upon completion of the training, observers provided feedback about their perceptions regarding policies and procedures. Video observations were discussed with the potential observers. All observers were trained to use the observation protocol through online interactive training and follow-up face-to-face interactions. Additionally, university employees were certified in CITI (Collaborative Institutional Training Initiative) Training. Within the CITI program, two courses were completed: (1) Human Subjects Research - Group 2. Social / Behavioral Research Investigators and Key Personnel and (2) Social and Behavioral Responsible Conduct of Research.

In over half of the observations, there were two observers in each observation. Coders recorded separate responses. In the cases where there may have been a disagreement in coding, the two observers met and discussed the differences. Results were then submitted as one observation for a total of 25 unique observations.

Data Analysis

Statistical analysis was conducted to determine a quantitative evidence score for each component. Based on evidence scores, each component was then assigned a rating for evidence of fidelity (e.g., **no evidence, limited, marginal, adaptive, intended**). Ratings were determined by the level of evidence of the preferred expected and intended behavior (see Table 5).

Table 5

Fidelity of Implementation Qualifiers

Fidelity Rating	Description
Intended	Evidence of the intended behavior approximately 80% or greater.
Adaptive	Moderate evidence of the intended behavior approximately 60 - <80%.
Marginal	Some evidence of the intended behavior approximately 40 - <60%.
Limited	Limited evidence of the intended behavior approximately 5 - <40%
No Evidence	Evidence less than 05% of the intended behavior.

The following variables were considered in the fidelity score. Fidelity scores were calculated based on these variables for both assessment and non-assessment observations. It was not expected that schools would have a perfect fidelity score; rather, the score provides a quantitative overview of the fidelity by school and for the district.

Table 6

Fidelity Variables by Framework Components

Variable	Code	Variable	Code	Variable	Code
Privacy was Fostered	EN	Instructor Redirects Distractions	Ped	Worked on Istation the Whole Time.	SE
Access to Technology	EN	Instructor Focuses on Students	Ped	Used Headphones All the Time	SE
Internal and External Interruptions	EN	Reminded Not to Socialize	Ped	Paused Pressed by Students	SE
All Students Have Working Headphones	EN	Reminded Raise Hand for Help	Ped	Curriculum Usage	SE
Pre-Usage Checklist	Pro	Behavior Concerns Were Addressed	Ped	Assessment Usage	SE
Thirty minutes was Allotted for Use	Pro	Students Reminded to Pause	Ped		
Teacher Survey: Features	ED	Instructor Responded to Disruptions	Ped		
Teacher Survey: Self-Efficacy and Use	ED	Instructor Walks Around	Ped		

Note. EN = Environment, Pro = Procedural, Ped = Pedagogical, SE = Student Engagement

Findings

Fidelity Ratings

There are five components in the Fidelity Framework and in this report each component has an associated fidelity rating: (a) Environmental Fidelity, (b) Procedural Fidelity, (c) Educative Fidelity, (d) Pedagogical Fidelity and (e) Student Engagement Fidelity. These scores are reported by district and sample schools, except for Educative Fidelity, which was calculated at the district level only. Educative fidelity was calculated for the district level only and reported for all schools in the district. For Procedural Fidelity, scores were calculated for both assessment and non-assessment from the observations. The findings are presented based on the Fidelity of Implementation Framework for Istation (see Table 1 and Table A1 in the Appendix).

Levels of fidelity varied by school, grade, and teacher; however, an overall mean score was determined per school and nominal qualifiers were assigned by school for four of the five components. Fidelity of Implementation was not anticipated to be 100%; in practice, adaptive fidelity occurs (Quinn & Kim, 2017) and fidelity ratings above 80% are rare (Durlak & DuPre, 2008).

Structural–Environmental Components

The conditions in which a student uses a computer-adaptive reading program, including classroom setup and environmental conditions, may influence students' level of focus or concentration and their growth in technology-assisted learning. The Environmental components are unique to this study and have not been explored in other literature. The nature of computer-based learning warrants evaluating the environment as it relates to the fidelity of implementation. Computer-based interventions rely on multiple technologies like Internet access, working devices, and peripheral devices. Variables considered for this component are those that provide a learning environment that supports computer-based learning, including access to technology, room organization, and the absence of distractors during Istation usage. An overall structural-environment score was computed by school, division, and district. The overall district rating represents the lowest possible level of adaptive fidelity (see Table 7). Throughout the remainder of this chapter, factors that contributed to the score, as well as qualitative evidence, are presented.

Table 7

Structural-Environmental Fidelity

School	Total Score	Nominal Qualifier of Fidelity
Middle School A	54%	Marginal
Middle School B	55%	Marginal
Middle School Average	54%	Marginal

Classroom Settings by Assessment and Non-Assessment

Room organization can support learning, especially in technology-rich environments (Brooks, 2011). For both assessment and non-assessment observations, all observations occurred in a classroom, with the exception of one observation which occurred in a computer lab. Within classrooms, room setups varied (See Table 8). Room designs included u-shape, rows, groupings, centers, or a mixture.

Table 8

Assessing Istation Room Organization

Criteria	Total Observed	Percentage
Tables	7	28%
Desks	12	48%
Learning centers	3	12%
Mixed (1:1 at tables & desks)	3	12%

Room Organization and Visual Stimuli

Visual distractions (e.g., watching someone else's screen, viewing other activities in the classroom) can be reduced through the design of the classroom (Barrett, Davies, Zhang, & Barrett, 2017) which may also include implements to support privacy (e.g., a file folder as a divider between machines). Only 16 of the observations evidenced supplementary privacy implements. In all cases, this consisted of an Otterbox laptop case that limited ancillary visual stimuli. However, in some cases, the organization of the desks or tables created private space that may have prevented onlooking but not necessarily other visual distractors. Although the use of privacy implements were tracked, this observation value was not included in the environment fidelity score as it was not a critical component but a preferred component.

Technological Access

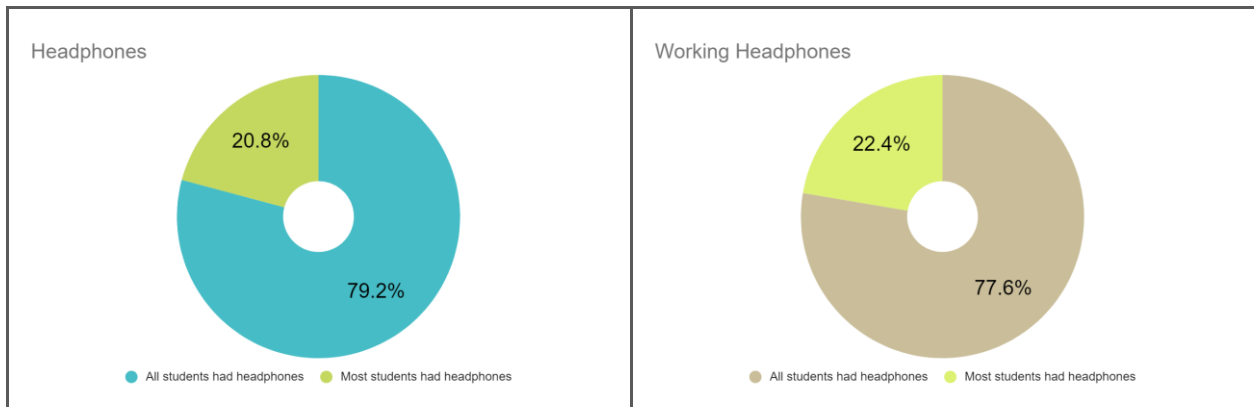
In a computer-based learning program such as Istation, technology comprises the primary medium for learning, and access to functioning technology is a necessary environmental component for effective implementation. Access issues have been a known barrier for students consistently using computer-supported learning (Garland & Wotton, 2002). All of the schools observed in the district utilized Chromebooks ($n = 25$), provided by the district for one-to-one access to technology-based learning tools. Because these devices were new, teachers indicated that they had few access issues. In observations, most students accessed technology individually at tables or desks.

During Istation usage, headphones are key technological supports to enhance the learning environment. Without headphones, noise in the room can be a distraction for students, which may be especially problematic during timed

assessments. Because the program supports individualized and adaptive instruction and students' instructional points vary, using the Istation Reading program without headphones can contribute to unnecessary sound distractions for others. Simply put, headphones can reduce noise, thereby increasing focus.

Figure 2

Headphones for Students

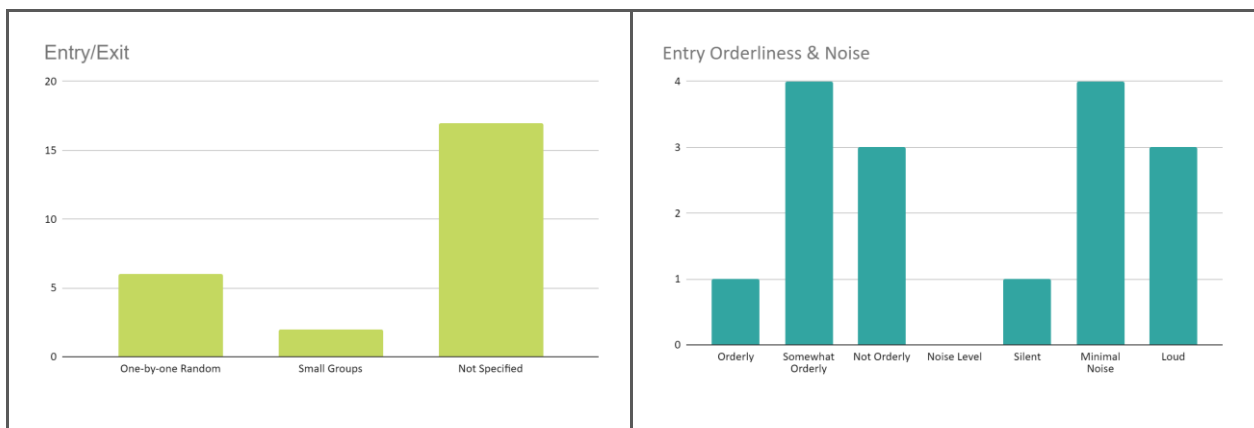


Classroom Transitions

Research findings identify the importance of transitions between classroom activities. Transitions may include initial arrival or final departure from the classroom, changing academic subjects, taking snack breaks, lining up to go to lunch, the restroom, or electives. Orderly and effective transitions can contribute to students' focus, concentration, and increased time on task (Haydon, DeGreg, Maheady, & Hunter, 2012). Of the $n = 25$ unique observations in which entries into the classroom were witnessed, all included adult supervision. Most of the observed transitions were categorized as orderly with minimal noise.

Figure 3

Classroom Transitions



Internal and External Interruptions

It is important that students are able to maintain their focus on Istation tasks, particularly during assessments. Both internal and external interruptions may compete with students' abilities to focus (Odden & Archibald, 2009). Examples of external interruptions included: (a) someone entering the classroom, (b) announcements over the intercom, (c) fire alarm drills, (d) hallway noise, and (e) bells ringing. Internal interruptions may stem from students talking to one another, teachers talking with students or other teachers, and other classroom-derived noises such as moving books or desks. In over 65% of the observations, either an internal or external interruption was observed (See Table 9).

Table 9

Interruptions During the Observation

Criteria	Count	Percentage
External interruptions occurred	17	68%
No external interruptions occurred	8	32%
Internal interruptions occurred	20	80%
No internal interruptions occurred	5	20%

Structural–Procedural Component

The *Procedural Fidelity* scores were determined by variables associated with the pre-usage checklist for assessment and non-assessment (see Table 10). All scores were determined by observation. An overall procedural fidelity score indicated that the district evidenced adaptive fidelity regarding the procedures related to Istation Reading use. Throughout the rest of this chapter, variables that contributed to the Procedural Fidelity rating will be described in more detail.

Table 10

Procedural Fidelity

School	Pre-usage checklist	Allot 30 minutes	Overall Procedural Rating	Nominal Qualifier
Middle School A	80%	100%	90%	Intended
Middle School B	61%	100%	80%	Intended

Middle School Rating	71%	100%	75%	Adaptive
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Pre-Usage Directions Checklist

Pre-usage directions were evaluated based on a defined checklist derived from the teacher toolbox within the Istation program. The checklist varied by the type of observation (e.g., assessment and non-assessment; See Table B1 in Appendix B). Demonstrated in Table 11 are the cumulative findings for all observations regarding pre-usage instructions. Most observations recorded ($n = 14$; 56% of the sample) evidenced fewer than 7 items from the checklist, meaning fidelity was 50% or less for the Pre-Usage Checklist. The following provides the criteria from the Pre-Usage Checklist and the percentage of compliance by item. For more nuanced results please consult Appendix B1.

Table 11

Pre-Usage Checklist Percentage

Instructions Included	Percent	Assessment Only	Percent
Students were instructed to find an open device or computer space	24	Instructor explained the assessment process and setting	56
Students were instructed to put headphones on	22	Instructor encouraged a positive attitude	40
Students were instructed to work independently	16	Instructor referenced and/or explained Istation Application Icons and Indicators	8
Students were instructed to not talk	76	Students were told the assessment was a test	72
Students were instructed to raise hands for assistance	32	Students were instructed to keep their eyes on their own computers	24
Students were instructed to click “pause” before raising their hands	24	Students were told to work as quickly as possible without guessing	28
Students were instructed to work only on Istation	36	Teachers improvised directions to adapt to their classroom setting.	10
Teacher provided login information or way to access Istation	40	Pre-directions were not observed - teachers started without pre-directions	8

During 44% of the observations, teachers utilized a PowerPoint presentation to introduce and explain the importance of Istation benchmarking assessment.

Structural–Educative Components

Structural Educative components reflect what teachers need to know in order to maximize Istation benefits. In this study, the knowledge of what teachers need to know in order to implement Istation effectively was determined

through the teacher survey. Teachers from across the district answered questions related to: (a) perceptions of Istation guides reading instruction, (b) teachers' professional development and training related to Istation, and (c) teachers' self-efficacy for using Istation. An overall score was calculated for the district and was qualified as adaptive fidelity. The results are presented in Table 12.

Table 12

Educative Fidelity by District and School Division

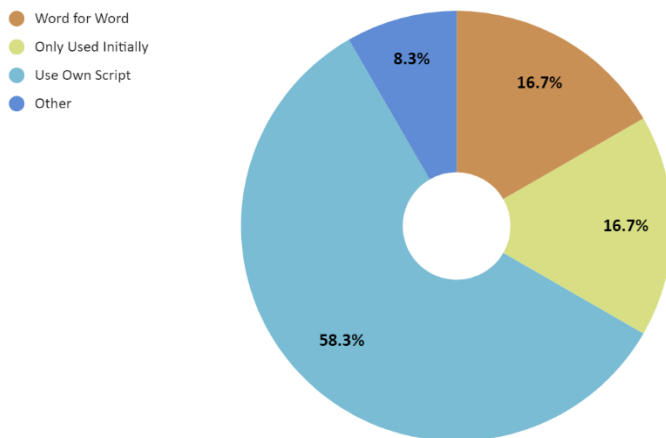
School Division	Percentage	Qualifier
All Middle Schools	65%	Adaptive

Formal professional development and training are conducted by the district, the school, and are available online through the Istation teacher dashboard. Informal training may take place by consulting a more knowledgeable person who has experience using Istation, like a colleague or a literacy coach. On-site, local experienced users can be asked to provide insights on aspects of the program related to district-specific guidelines and culture.

Almost three-quarters of the surveyed teachers (72%) indicated that they had participated in some form of professional development and 70% of the respondents expressed that the professional development that they received supported their use of Istation. Most respondents had participated in district or school specific Istation training rather than Istation-delivered training. Less than 40% of the teachers who responded had watched any of the free Istation training videos.

Figure 5

Types of Pre-Assessment Script Indicated in Teacher Survey



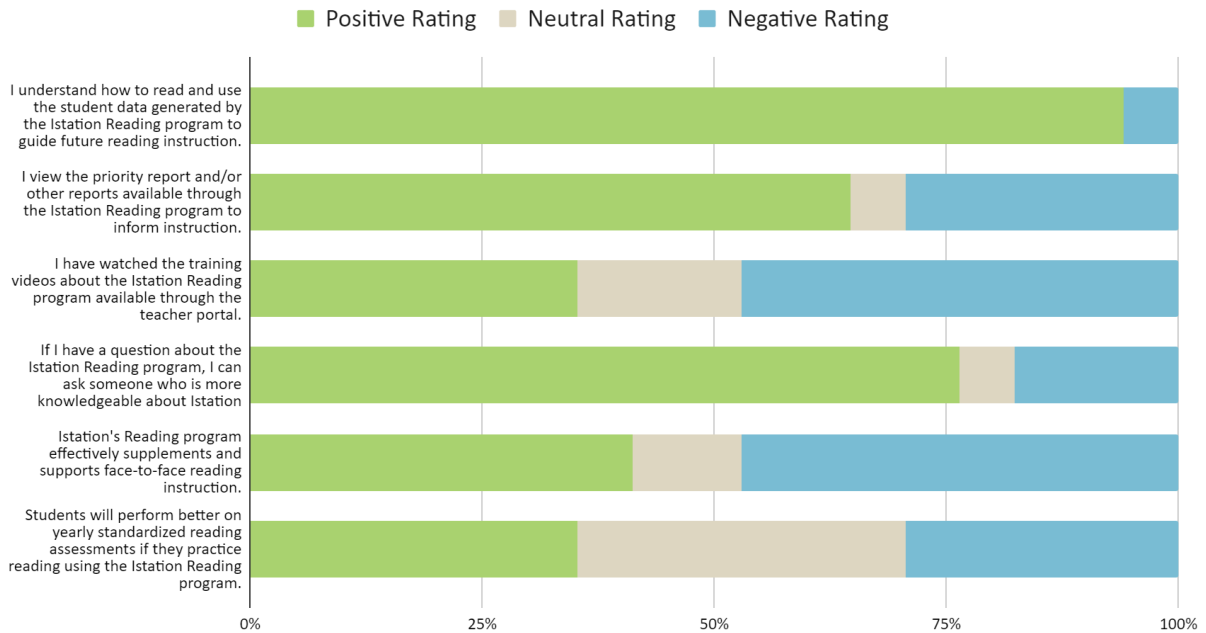
Other survey questions were informative as to the knowledge teachers have to adequately implement the program and mirrored the face-to-face observations conducted in the district. While Istation provides a script for teachers to utilize, most teachers observed did not use the script verbatim or even used an introduction script for assessment (see Figure 5). Very few survey respondents expressed that they used the script word-for-word for each assessment. Some teachers modified the script for each assessment. A large portion of respondents indicated that they never

used the script or had their own customized version of instructions. Only one respondent replied "other," elaborating that they had never received a script.

Figure 6

Teacher Survey Ratings Regarding Educative Fidelity

Ratings of Educative Items from Teacher Survey



Teachers were asked in the survey to provide their level of agreement to statements regarding the amount of time their students used the Istation program per week. At the time of the survey, it was recommended that students in Academic Level One (Tier 1) use the curriculum portion of the program approximately 30 minutes per week. Students in this level are those who scored in the 40th percentile or greater on their first assessment for the school year. Whereas it was recommended that students in the 20th-40th percentile complete 60 minutes a week, and students in the lowest academic level and in the most need of reading support (Tier 3) complete 90 minutes a week. The perceptions of the majority of the teachers in this survey indicated that they mildly to strongly agreed to some level that their students were meeting these usage recommendations.

Table 13

Use of Istation by Academic Level

Statement	Strongly Agree	Moderately Agree	Mildly Agree	Neither Agree Nor Disagree	Mildly Disagree	Moderately Disagree	Strongly Disagree
Usually, my Tier 1 students use the Istation Reading program for 30+ minutes a week at school.*	12%	0%	6%	6%	12%	6%	59%

Usually, my Tier 2 students use the Istation Reading program for 60+ minutes a week at school.	0%	24%	12%	12%	12%	12%	29%
Usually, my Tier 3 students use the Istation Reading program for 90+ minutes a week at school.	0%	11%	28%	6%	11%	17%	28%

Note. Istation (new guidelines 2019) recommends that students in the 40th percentile and above use the program for 30 minutes a week and those in lower percentiles utilize the supplemental computer-adaptive reading curriculum 40 minutes a week.

Middle school teachers provided supportive information as to their understanding of how Istation should be used in their classrooms and how their understanding supported student learning. The qualitative results in Table 14 illuminated the need for greater educative communication regarding district expectations. Nevertheless, the monthly and benchmarking assessments supported instructional grade-level planning in middle school. These actions demonstrated the application of evaluating and leveraging the learner analytic data from the Istation Reading program.

Table 14

Educative Component: Middle School Focus Group Themes

Themes	Summaries
<i>District Guidelines</i>	There was confusion among the participants as to what the district guidelines were for usage, assessment, and if they were required to look at the student data. The teachers mentioned that they decided when to give the assessment to their students. Others mentioned that benchmarking takes place at the beginning, middle, and end of the school year.
<i>Instructional Planning</i>	The teachers mentioned that they consulted assessment results when involved in corporate group planning. Approximately 66% of the teachers at one school focus group and 45% at the other school systematically considered the monthly assessment scores for instructional planning. Benchmark assessments helped the teachers determine how to support students. An area for improvement in instructional planning to further support teachers related to class organization. Some teachers noted that it was hard to find all of their students as some were listed by the district in other classes.
<i>Supplemental Curriculum and Reports</i>	Twenty-two percent of the teachers indicated that they assigned their students lessons to complete from the computer-adaptive curriculum. This discussion sparked other participants to ask how to do that for their students.

<i>Home Usage and Contests</i>	None of the teachers in the focus group knew that students had access to a home component. Further, they have not considered providing digital resources for inclement weather days. However, teachers indicated that the school-based Istation usage contest encouraged students to use the program more during the school assigned times.
<i>Inclement Weather School Breaks</i>	The program was employed at irregular intervals during the spring semester which was attributed to state assessment demands and multiple days out of school. Teachers mentioned that the inclement weather experienced this year interrupted how they might have used Istation. Many admitted that they did not have their students use the program with fidelity during the second half of the school year as they felt they did not have time. Some teachers agreed that practicing Istation during extended breaks (e.g., winter break) is needed to improve comprehension.

Instructional–Pedagogical Components

Instructional-Pedagogical components refer to ways the teachers, instructional coaches, and support staff demonstrate actions and attitudes related to successful implementation including interaction with the students. The next section demonstrates the instructors’ actions and behaviors while students used the program. All data for this component was derived from the on-site observations conducted at the observation schools. The *Pedagogical Fidelity* for the district per school was adaptive to intended and presented by school (see Table 15).

Table 15

Instructional Pedagogical Fidelity

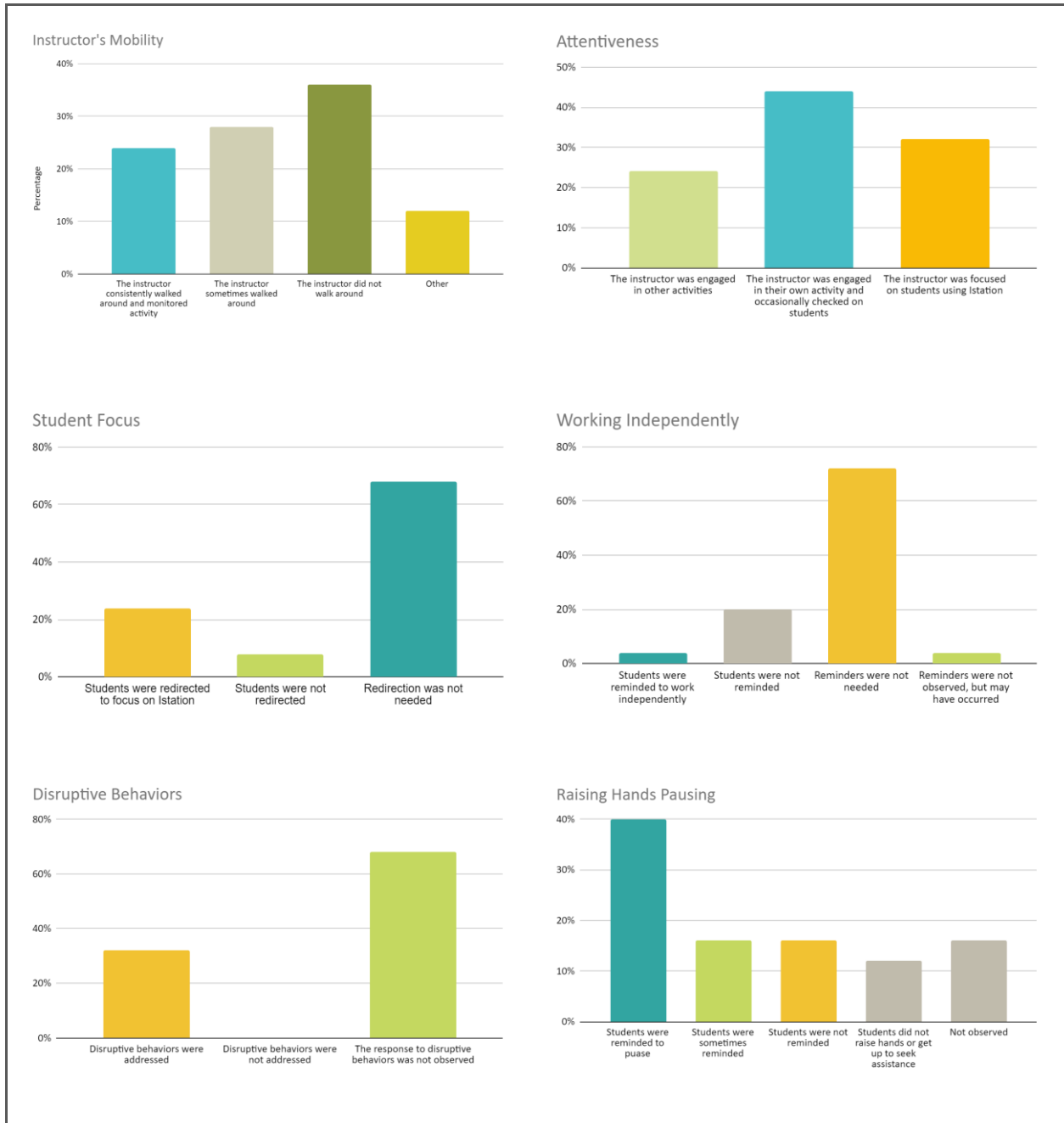
School	Score	Rating
Middle School A	56%	Marginal
Middle School B	76%	Adaptive
Middle School Rating	71%	Adaptive

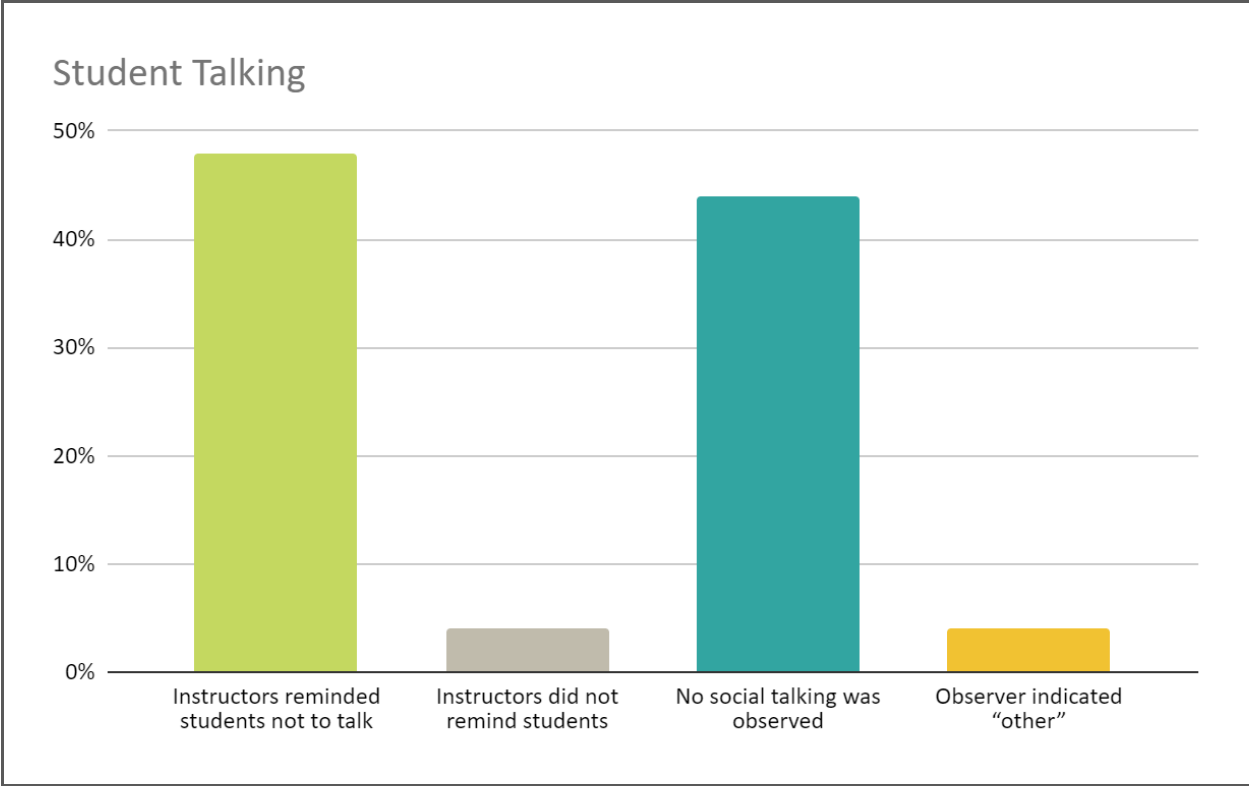
At every observation, there was 100% compliance for adult supervision, as there was always an adult present in the room. In just over 30% of the observations, instructors were consistently attentive to students. Attentive behavior was demonstrated by the physical actions of the adult in the room (e.g., the instructors were either looking at the students and what the students were doing or monitoring the students’ progress using screen-monitoring software). Another evidence of attentiveness was if the supervision was consistently taking place from a sedentary position or a mobile position. In some cases, the position of the instructor prohibited views of all the students’ computer screen and in turn, their compliance to being in the correct program. In almost 40% of the observations, the instructor did not walk

around to check on the students after assigning students to use Istation (see Figure 7). In many of the observations, negative or disruptive behaviors were not observed. However, when disruptive behaviors occurred, the majority of the time, the instructor mediated a solution.

Figure 7

Instructors' Supervision



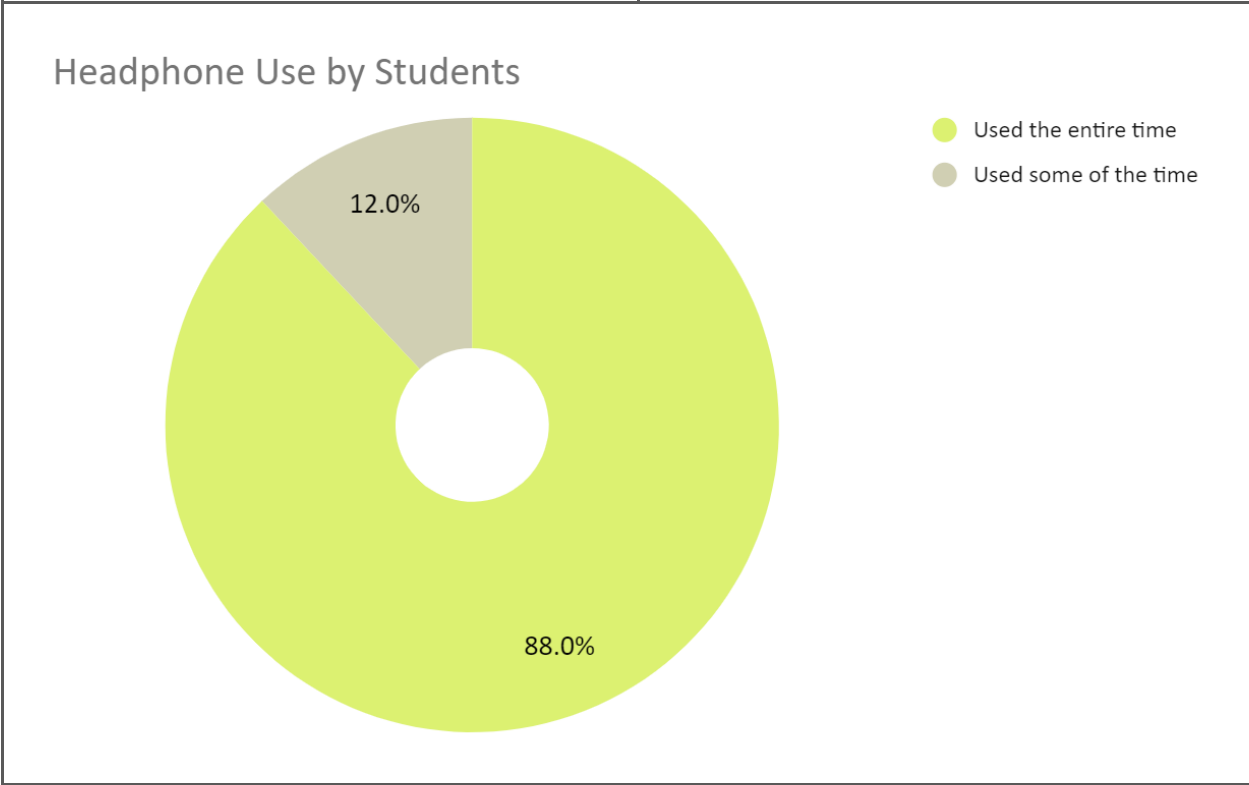
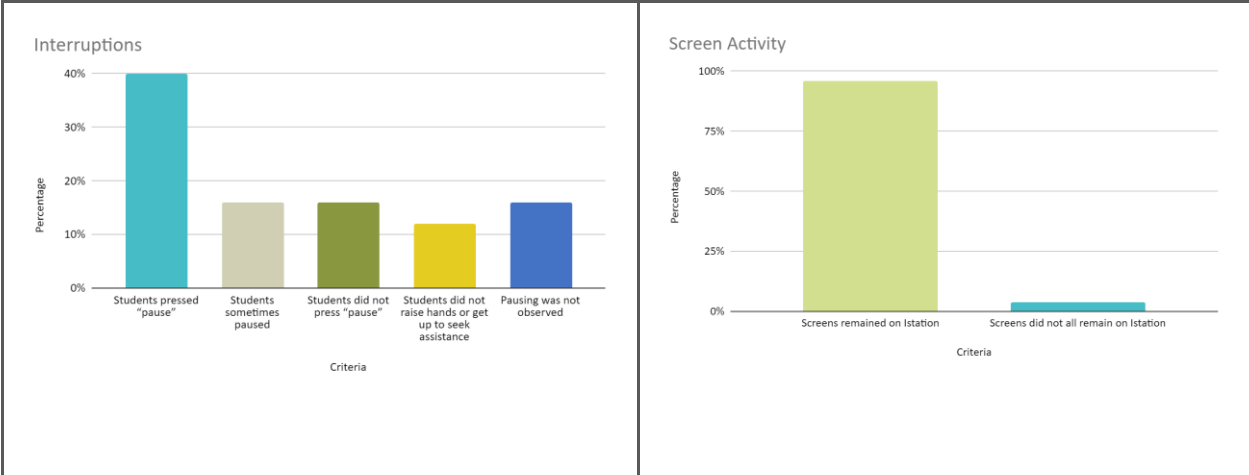


Student Engagement by Observation

Student engagement measured by observation included the actions students took while using the Istation Reading Program. Students have a level of choice and autonomy when using a computer (Garland & Wotton, 2002). Even when assigned to use a certain program, students do not always follow instructions. In 96% of the observations, students went into the correct program and remained in the program the entire time they were assigned to use the program. In the other cases, they went into a math program, played unrelated computer games, or initially went into the correct program but later switched to another. These students' actions mostly went undetected during the observation. Figure 8 demonstrates students' behaviors regarding what they did when they had a question or needed to leave their computer to get a tissue or use the restroom, what was on the screen, and if they kept their headphones on while using Istation both for assessment and non-assessment observations.

Figure 8

Students' Interactions Related to Student Engagement



The overarching student engagement score was comprised not only of the aforementioned onsite observations conducted at the school but also included the percentage of compliance to the districts assessment benchmarking schedule, curriculum, and monthly assessment usage. The qualifier scores ranged from marginal to intended fidelity (see Table 17). There were mixed messages at the school level on how Istation was supposed to be used. While there were some classes who evidenced consistent use of the supplementary computer-adaptive reading program, there was greater fidelity for benchmarking.

Table 16

Student Engagement Fidelity

School	Behavioral Observational	Curriculum Fidelity	Assessment Fidelity*	Benchmark Assessment Rating**	Qualifier
Middle School A	--	25%	63%	91%	Adaptive
Middle School B	--	44%	69%	92%	Adaptive
Overall Middle	--	35%	66%	91%	Adaptive
		Marginal	Adaptive	Intended	

Assessment (Benchmarking)

Istation states that assessments generally take 30 minutes to complete in full. However, our analysis indicated the mean time to complete an assessment was under 20 minutes of time. Considering the time it takes to transition, receive instructions, log in, and start the assessment, scheduling 25 to 30 minutes for this process would provide most of the students the time they need to complete the assessment. In this district, on average, students completed the October benchmark in the range of 14 to 20 minutes (See Table 18).

Table 17

Mean Assessment Minutes by Assessment for October

School	Test and Grade	Minutes
Middle School A	MS AR(6-8)	14.7
Middle School B	MS (6-8)	15.0

Observers captured the time allotted for the assessment and the subsequent behaviors of students who completed the assessment with time to spare. Of the assessment observations that were conducted for the full duration of the assessment, at least thirty minutes of time was afforded. In 36% of observations ($n = 9$), after students completed the Istation assessment, students began using the computer adaptive supplemental curriculum.

Student Engagement (Reading Achievement)

Students' engagement as measured by reading achievement was not a part of the Fidelity rating but is included (Appendix B) to contextualize the fidelity rating by school. The mean achievement in the district exceeded Istation expected results (see Tables B1 and B2). When considering these results by school the results are the same. The use of curriculum and the fidelity of implementation affect reading achievement (see Table B3).

Discussion

A large fidelity of implementation and use study was conducted in a mid-Atlantic school district over the course of the 2018-2019 school year. Twenty-five unique fidelity observations took place at two middle schools, one high performing schools and one low performing schools as measured by the prior school year's state assessment. One school was classified as City: Small and the other was classified as Suburb: Small (See Table 3).

The discussion is presented by component as indicated in the *Fidelity of Implementation for the Istation Reading Program*. While these findings represent the observations of the implementation of Istation, it does not mean to imply that these were the circumstances every time students used Istation. The district as a whole demonstrated adaptive fidelity, and the ratings by component indicate that *Procedural* and *Pedagogical Fidelity* were the strongest components in the district (see Table 19). The *Environmental* and *Student Engagement* components were rated as adaptive fidelity; however, with small procedural changes there may be greater adherence to key factors.

Table 18

Ratings by Component Middle School

Component	Overall Rating
Environmental	Adaptive
Procedural	Adaptive to Intended
Educative	Adaptive
Pedagogical	Intended
Student Engagement Benchmarking	Intended
Student Engagement Usage	Adaptive
Student Behaviors	Adaptive

Note. See Appendix A Table A1 for data sources to determine the rating and the weighting of the variables that comprise the fidelity of implementation components. See Table A2 to determine scores by division.

Structural–Environmental Components

There are many district highlights related to the physical environment for the Istation computer-adaptive testing and supplemental curriculum intervention. First, the district supports a one-to-one program, meaning that each student has a district-owned Chromebook that they use during the school year. Students are familiar with the devices, which

can eliminate the barrier of having to learn the technology in favor of focusing on the Istation program (Klein, Noe, & Wang, 2006).

The use of headphones was prominent, although there were multiple times where students did not have headphones or did not have working headphones. In one observation, technical difficulties prevented students from using their designated devices. Students using their Chromebook without headphones were a distraction to other students in the classrooms. With distractions, students lose focus, which can impact achievement (Rodrigues & Pandeirada, 2018).

Ways to mitigate this environmental barrier in classrooms are to either use a class set of headphones or have several spare loaner pairs of headphones available as needed. Currently, observations recorded students working in the hallway (outside of supervision) when there was headphone failure or students were instructed to sit quietly while others were using the program. Further, there may be times that a spare Chromebook should be available when devices are not charged or are non-working.

Privacy during assessments can reduce external visual stimuli. Privacy implements were observed but more research is needed to determine the impact of reducing visual distractors. By virtue of using a mobile device, there may be an unrealized element of privacy that is yet undiscovered. It would be beneficial in cases where young students are sitting close together at tables to utilize privacy screens (like file folders) to reduce onlooking and other visual stimuli to avoid distraction and maintain student focus (Gaspelin, Margett-Jordan, & Ruthruff, 2015).

Structural–Procedural Components

There was limited adherence to the Pre-Usage Checklist; yet, the checklist for Istation Reading program assessment is an integral component of what Istation recommends to teachers to employ on assessment days. Reasons for the limited compliance may be related to teachers not being aware of potential pre-directions, the repetitive nature of frequent program use, the classroom set-up (centers), or a lack of understanding about the importance of pre-direction procedures.

Since Istation may be incorporated into classroom routines, there may not be a need to have reminders for every time students use the Istation Reading Program (Leinhardt et al., 1987). Conversely, the use of the program may be considered a rote experience, and the importance of benchmarks may not be realized by the students when they take an assessment. Perhaps a reminder can be posted at the learning center on assessment days and privacy implements can be provided to reduce visual distractions. The district may consider investigating the best types of headphones to use to minimize the auditory distractors that can happen during assessment periods.

When Istation is being used for assessment purposes, it is recommended that an assessment day script be employed. Since there is a lack of evidence that following the script verbatim is a necessity for fidelity and for student achievement, deviations from the script may not be a problem. What is most important is that teachers do speak to their students about the importance of the monthly assessment and/or benchmarking assessment. Typically, standardized achievement testing employs the use of a script to standardize the assessment conditions. However, a secondary benefit of a script may signal to students that the assessment or activity is important. A standardized script is provided for use, but few teachers knew it existed. The district may consider discussing the use of a script (especially during benchmarking periods) to signal to students the importance of their actions and to increase fidelity.

The benchmarking and assessment scripts could be district-wide and relevant to the district while including critical components.

Structural–Educative Components

The educative aspects of implementation for teachers and literacy coaches can be realized through both face-to-face and online professional development training. While the majority of the teachers who responded to the survey indicated that they had participated in Istation professional development sessions, they were unaware of key components of Istation that could make a difference in student achievement. For example, the home component of the program was unknown by most teachers, yet this component can make a difference in student achievement, especially among those learners at the greatest risk of reading failure (Sutter, Campbell, & Lambie, 2019).

Regarding the modality for participating in professional development, the majority of the surveyed teachers indicated that they had participated in face-to-face professional development. Conversely, the on-demand professional development available through the reading program was under-utilized. Explanations for the limited access of on-demand professional development and training may relate to teachers not being aware of the resource or because there is not a perceived need for the online professional development. Additional research is needed to determine professional development needs and preferred modalities for delivery.

Self-reports by middle school teachers indicated a lack of fidelity in the second semester even among learners that needed the intervention the most. As such, there is a need for more targeted training regarding how the assessments and curriculum can aid teachers in designing targeted, personalized reading instruction. A suggestion for the district is to discuss the importance of consistent use of the program with teachers to increase fidelity of use (curriculum and assessment). Based on the survey and observations, it may improve fidelity if teachers are aware of the various aspects of how the program can support instruction through the data analytics provided that identify students' reading deficits and strengthens.

Instructional–Pedagogical Components

The instructor's interactions affect student achievement and motivation (Schechter, Kazakoff, Bundschuh, Prescott, & Macaruso, 2017). If the use of the program for assessment or non-assessment is assigned and there is a lack of supervision or engagement with students when needed, the students may not feel that what they are doing is important and in turn display inattentive behaviors that contribute to lower achievement. The importance of attending to the formative and benchmarking assessments relates to the computer-adaptivity of the curriculum. A formative assessment that is not reflective of a student's abilities may level the curriculum below the student's ability range. In order to emphasize the importance to the students of using the computer adaptive reading program, teachers may verbally express the importance through their words and actions (Nichols & Dawson, 2012).

Likewise, the consistent attentiveness of the instructor during the observations was around 30%. One by-product of diminished attentiveness related to some students attending to other computer programs or delayed log-ins, not giving the student ample time to engage with the program. Students' perceptions of teacher attentiveness in a classroom may equate to students' performance on their task and achievement of mastery of skills (Vedder-Weiss, 2017). Teachers' actions, attitudes, and mindsets about a reading intervention makes a difference in reading achievement and motivation with students showing significant improvements in their reading skills when teachers were more engaged compared to students with instructors who were less engaged (Schechter et. al., 2017).

Inclement weather caused students to miss multiple days and experience delayed openings of school during the second semester of school. Throughout the year there was a significant drop in usage of the program among the middle school students that used the program. Some of the regression of use can be attributed to inclement weather (Holmes, 2002). In personal conversations with teachers at both middle schools, they stated that after being out of school for twelve days they made the decision to not have students use the program in order to prepare students for the writing test. The importance of consistent use of the reading assessment and supplemental reading program was not clear to these instructors. There could be increased fidelity by providing additional professional development and increasing communication about district expectations regarding frequency of assessment and use. Further, communication could be extended to students and parents about online district-wide resources students could access during inclement weather and holidays.

Instructional–Student Engagement Components

Student engagement was measured in four ways. On-site observations by the research team, curriculum use, monthly assessment use, and benchmarking assessments all contributed to the *Student Engagement Fidelity* of implementation score. In grades 6-8, schools were more concerned about benchmarking the students' reading achievement (three times during the school year) than assessing students reading monthly and adjusting instruction on a consistent basis

There were cases when the benchmarking assessment occurred in small groups while the rest of the class was listening to whole class instruction. A noisy classroom environment can hamper students' academic performance and does not provide the best assessment environment (Dockrell & Shield, 2006). Some students may not be able to completely concentrate on their reading assessment, thereby increasing the likelihood that students' full reading capabilities may not be realized. Further, an incomplete assessment means the next time the student logs in to Istation, the student will be prompted to complete the assessment from the last system save point, leading to student frustration as they are redoing something that they may have done before but not completed. The consequences of an incomplete assessment include: (a) a delay in the reading curriculum being adapted and (b) students having less time dedicated to their personalized supplemental reading curriculum.

Finally, according to the usage records, only 45 grades 6-8 students in the district accessed the Home Curricular component and used the Home Component for over 100 minutes during the entire school year. The affordances of using the home component may provide students increased time to practice reading which may impact reading achievement.

Limitations

There were several limitations to this study including: (a) interruptions to school for inclement weather, (b) inconsistent use of the program, and (c) the method of observation. Students missed at least 11 days of school during the second semester of school due to unexpected weather-related closures. Further, there were delayed start times for school as well. These interruptions impacted the second district-required benchmark and the use of the reading program. However, these interruptions are realistic to what can take place when using the program.

Inconsistent use of the Istation Reading program due to inclement weather prevented observations at the middle school; in turn, only one semester of observations was recorded from the middle schools. While the time was

scheduled for use of the program, upon the observation team's arrival at the school and visits to each Language Arts classroom in the schools, the teams were notified by teachers that they were not using the program that month. Most teachers cited inclement weather, substitute teachers, or the need to capture the time for SOL preparation as reasons for non-use.

Determining fidelity through observation has some challenges. It is possible that during observations teachers changed their natural behaviors over concern about being observed. True compliance may have been lesser or greater than was recorded (Breitenstein et al., 2010). To mediate these challenges, observations were conducted at varying time points with multiple teachers at multiple schools and other sources of data were also used to inform fidelity rankings (O'Donnell, 2008). The following sections provides recommendations specific to the district regarding the program.

Recommendations

After completing a year of observations in this mid-Atlantic school district, speaking with teachers and administrators in the school district, analyzing survey and focus group data, and reviewing the literature regarding promising practices when implementing a technology-based intervention, the following recommendations are provided:

1. Increase teachers' self-efficacy for utilizing reports and resources embedded in the program through professional development training (Schechter et. al., 2017) and Individualized coaching (Goker, 2006; Puig & Froelich, 2007).
 1. Incorporate teachers who model use of the reports and resources to share their experiences with other teachers in formal and informal ways.
 2. Send out email tips and reminders.
2. Develop district-specific informal video training (three minute or less video reminders) to share with teachers through school-based meetings and for on-demand use by teachers.
3. Establish or re-envision and disseminate district-wide grade level specific written procedures for benchmarking assessment windows. Currently, there is not a shared understanding of expectations (Hilliard & Newsome, 2013).
 1. Develop guidelines for preferred benchmarking learning environments.
 2. Consider utilizing visual instructions for benchmarking assessments.
 3. Standardize written directions and procedure for analyzing the results of benchmarking and monthly assessments. In other words, develop shared understanding about how the data generated by the program should be used to guide instruction.
4. Literacy coaches and other academic administrative support staff can consistently review Istation usage and activity reports specific to a grade level at grade-level specific meetings.
 1. Develop a grade-level specific fidelity matrix.
 2. In collaboration with teachers, discuss self-evaluation of the district fidelity matrix.
5. Develop an inclement weather day reminder to alert parents and students about using the home component of the program. Research findings identify that home usage is a contributor to increasing reading achievement (Sutter, Campbell, & Lambie, 2019).
6. To increase student usage of the supplemental reading curriculum program, conduct a contest or introduce a reward ticket program as an extrinsic motivator for students to increase their reading.
7. Provide students access to the supplemental reading program through school-based, before- and after-school programs.
8. Investigate options to provide reliable access to technology, especially headphones as the lack of working headphones can impair learning opportunities. A class set of headphones could be purchased and individual headphones could be assigned to students for the school year and stored at the school.
9. Review pre-usage instructions with teachers and students before benchmarking periods.
 1. Email reminders and links to these directions.
 2. Consider inclusion in school-wide announcements or newsletters.
 3. Provide teachers verbiage to include in their weekly communications with parents.
10. Provide a forum for teachers to share their ideas to encourage students' focus on assessments and use of the program.

Conclusion

Implementation of the Istation Reading assessment and curriculum program was expected to be in the adaptive, 60-80% compliance, to the intended range of 80-100% compliance. Based on observations of Istation's Indicators of Advanced Reading (ISIP-AR) and the Istation supplemental computer adaptive reading program at two middle schools, the program was conducted with adaptive implementation fidelity in the observed district. When comparing the overall fidelity of assessment by high achieving schools and non-high achieving schools, as measured by the SOL, both types of schools evidence adaptive to intended overall implementation fidelity. Currently, the district assesses students' reading achievement through the computer-adaptive assessment, ISIP-AR, three times a year to benchmark students' reading achievement. Based on the findings from the observations, district administration can consider the assessment results of the benchmarking to be conducted with adaptive to intended fidelity. There are several recommendations listed throughout the report for the district to consider to improve implementation fidelity and to increase fidelity of use.

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Appendix A

Table A1

Framework for Fidelity of Implementation of Istation Reading

Structural Components			Instructional Components	
<p>Environmental</p> <ol style="list-style-type: none"> 1. Room <ol style="list-style-type: none"> a. Location b. Setup c. Privacy implements 2. Device availability <ol style="list-style-type: none"> a. Technological access 3. Environment <ol style="list-style-type: none"> a. Internal disruptions b. External disruptions 4. Transitions <ol style="list-style-type: none"> a. Room entry b. Room exit 	<p>Procedural</p> <ol style="list-style-type: none"> 1. Pre-usage checklist <ol style="list-style-type: none"> a. Instructions for using Istation b. Assessment instructions 2. Allot adequate time 	<p>Educative/Implementation Knowledge</p> <ol style="list-style-type: none"> 1. Knowledge of how to use Istation to guide instruction 2. Access to effective training 	<p>Pedagogical</p> <ol style="list-style-type: none"> 1. Monitoring of students during program usage 2. Teacher support and response to questions, distractions, and disruptions 	<p>Student Engagement</p> <ol style="list-style-type: none"> 1. Student time spent on Istation <ol style="list-style-type: none"> a. Curriculum minutes b. Assessment minutes 2. Student engagement in the assessment or lesson <ol style="list-style-type: none"> a. Headphones the whole time b. Pause button pressed when asking for assistance c. Engaged in Istation whole time

Adapted for this project from *(Century, Rudnick & Freeman, 2010)

Elements Included:

Structural–Environmental Components: The contextual features that set the stage and form the environmental backdrop for Istation use (e.g. room setup, conditions for learning, and devices).

Structural–Procedural Critical Components: Instructions for use as determined by Istation and by the mid-coastal district guidelines (e.g. procedures and policies) for use.

Structural–Educative Critical Components: The knowledge needed to implement Istation effectively (e.g. implementation and learning analytic).

Instructional–Pedagogical Critical Components: The manner the teacher, instructional coach, and support staff demonstrate the actions related to successful implementation including interactions with the students.

Instructional–Student Engagement Critical Components: The ways students interact with the Istation reading curriculum and assessment program.

Table A2

Framework for Fidelity of Implementation of Istation Reading with Scores by Division and District

Structural Components						
Component	Variable	Data Source	How it was Measured	Elementary Score	Middle School Score	District Score
Environmental: Contextual features that set the stage and form the environmental backdrop for Istation use	Room Location Setup Privacy Implements	Observations	Descriptive	--	--	--
	Device Availability Headphones	Observations	Observation Index	Adaptive (73%)	Intended (80%)	Adaptive (75%)
	Technological access	Observations	Qualitative	--	--	--
	Environment Internal & External disruptions	Observations	Observation Index	Marginal (48%)	Limited (28%)	Marginal (44%)
	Transitions Room entry Room exit	Observations	Qualitative	--	--	--
Procedural: Instructions for Use	Pre-usage checklist	Observations	Observation Index	Intended (80%)	Adaptive (71%)	Adaptive (78%)
	Allot 30 minutes	Observations	Observation Index	Adaptive (70%)	Intended (100%)	Adaptive (77%)
Educative: Knowledge needed to implement Istation effectively.	How to use Istation to guide instruction Istation features	Teacher Survey	Pedagogical Fidelity Score	Adaptive (71%)	Adaptive (65%)	Adaptive (70%)
	Using Istation to plan lessons	Focus group	Qualitative	--	--	--

Instructional Components						
Pedagogical: Teacher, coach, and staff actions related to successful implementation	Monitoring of students Teacher engagement & response to disruptions & distractions	Observations	Observation Index	Intended (80%)	Intended (80%)	Intended (80%)
Student engagement: How students interact with Istation	Time on Task					
	Curriculum Minutes	Istation data	Curriculum Fidelity Score (Average min/student)	Intended (96%)	Marginal (48%)	Adaptive (72%)
	Assessment Minutes	Istation data	Assessment % of Compliance	Intended (95%)	Marginal (51%)	Adaptive (77%)
	Benchmarking Assessments	Istation data	Benchmarking % of Compliance	Intended (95%)	Intended (91%)	Intended (93%)
	Student behaviors Headphones use Pause button pressed Whole time on Istation	Observations	Observation Index	Intended (81%)	Adaptive (63%)	Adaptive

Note: ** Only one semester of observations completed.

Appendix B

Table B1

Overall Paired Sample T-Test and Cohen's d for Grade 6

	<i>M1 (SD)</i>	<i>M2 (SD)</i>	<i>Diff.</i>	<i>t(df)</i>	<i>P</i>	<i>d</i>
Assessment 1 - 2 (<i>N</i> = 1056)	2046.48 (195.83)	2099.89 (200.85)	53.41	-22.652 (1055)	< .001	.27
Assessment 2 – 3 (<i>N</i> = 1056)	2099.89 (200.85)	2129.94 (202.84)	30.06	-10.973 (1055)	< .001	.15
Assessment 1 – 3 (<i>N</i> = 1067)	2045.36 (197.71)	2129.24 (203.52)	83.88	-30.602 (1068)	< .001	.42

Table B2

Paired Sample T-Test and Cohen's d for Grade 6 by Academic Levels

	<i>M1 (SD)</i>	<i>M3 (SD)</i>	<i>Diff.</i>	<i>t(df)</i>	<i>p</i>	<i>d</i>
Academic Level One (<i>N</i> = 727)	2148.56 (127.18)	2224.52 (153.23)	75.96	-24.348 (726)	< .001	.54
Academic Level Two (<i>N</i> = 167)	1920.24 (28.02)	2006.75 (80.03)	86.51	-14.245 (166)	< .001	1.44
Academic Level Three (<i>N</i> = 175)	1736.05 (126.25)	1850.29 (139.92)	114.24	-13.412 (174)	< .001	.86

Table B3**Overall Paired Sample T-Test and Cohen's d for Grades 7-8**

	M1 (SD)	M2 (SD)	Diff.	t(df)	p	d
Assessment 1 – 2 (N = 1892)	2160.51 (207.23)	2200.97 (206.99)	40.45	-18.148 (1891)	< .001	.17
Assessment 2 – 3 (N = 1892)	2200.97 (206.99)	2226.99 (211.43)	26.03	-10.661 (1891)	< .001	.07
Assessment 1 – 3 (N = 1931)	2160.51 (207.68)	2226.66 (211.82)	66.15	-27.857 (1930)	< .001	.31

Table B4**Paired Sample T-Test and Cohen's d for Grades 7-8 by Academic Levels**

	M1 (SD)	M3 (SD)	Diff.	t(df)	p	d
Academic Level One (N = 1096)	2296.34 (129.87)	2351.01 (160.61)	54.67	-18.308 (1095)	< .001	.37
Academic Level Two (N = 390)	2091.60 (49.91)	2150.06 (98.74)	58.47	-12.913 (389)	< .001	.75
Academic Level Three (N = 445)	1886.36 (136.64)	1987.54 (149.11)	101.17	-17.649 (444)	< .001	.71

Table B5***Paired Sample T-Test and Cohen's d for Grades 7 and 8***

	<i>M1</i> (SD)	<i>M3</i> (SD)	<i>Diff.</i>	<i>t(df)</i>	<i>p</i>	<i>d</i>
Grade 7 (<i>N</i> = 996)	2119.96 (192.24)	2190.84 (202.59)	70.88	-23.857 (995)	< .001	.36
Grade 8 (<i>N</i> = 935)	2203.70 (214.79)	2264.83 (214.86)	61.12	-16.337 (934)	< .001	.29
