EXPLORING THE IMPACT OF ENGAGED TEACHERS ON IMPLEMENTATION FIDELITY AND READING SKILL GAINS IN A BLENDED LEARNING READING PROGRAM

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The number of K–12 classrooms adopting blended learning models is rapidly increasing and represents a cultural shift in teaching and learning; however, fidelity of implementation of these new blended learning programs varies widely. This study aimed to examine the role of teacher engagement in student motivation and achievement in a blended learning environment. Reading skill data were analyzed from 19,366 students across 624 schools led by teachers defined as engaged users of a blended learning reading program (Lexia Reading Core5 [Core5]). Results showed significant improvements in reading skills during the analyzed period for the students of the engaged teachers in comparison to neighboring classrooms (171,850 students in the same 624 schools) of less engaged teachers.

Introduction

As the cost of educational technology decreases and classroom size increases, millions of students have digital devices integrated into their classrooms (Horn & Staker, 2011; Johnson & Haria, 2015). No longer is there a strong argument for just supplying
hardware and software to classrooms; instead, the focus is on helping teachers understand how to be effective and informed users of digital tools (Healey, 2015).

Blended learning, the integration of student-directed online learning with a teacher-led offline component, leverages digital technologies to provide students with more control over time, place, path, and/or pace of their own learning (Horn & Staker, 2011). Many studies on blended learning implementation, and subsequent teacher training, utilize high school or college-level samples of students and instructors; however, blended learning as a classroom practice has recently migrated into primary grades and implementations have been steadily rising (Picciano, Seaman, Shea, & Swan, 2012).

Typically, implementations of new curricular and classroom initiatives, like blended learning, are most successful with engaged teachers and engaged students. Even before integrating new technologies in the classroom, student learning outcomes have historically been tied to teacher engagement (Hardre & Reeve, 2003; Jang, Reeve, Ryan, & Kim, 2009; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Vansteenkiste, Niemiec, & Soenens, 2010) as well as both student and teacher motivation in the classroom (Deci, Vallerand, Pelletier, & Ryan, 1991; Lee & Reeve, 2012).

In this vein, prior studies on blended learning in secondary and higher education emphasize four key components to success: (1) the importance of teacher training (Gorozidis & Papaioannou, 2014; Hilliard, 2015); (2) the technical functioning of the educational tools (Hilliard, 2015); (3) the effectiveness of the programs on student outcomes (Hilliard, 2015); (4) and the importance of understanding blended learning as more than just placing technology into a classroom—it is about the integration of student-directed and teacher-directed, online and offline learning (Vaughan, 2014).

However, little research has been conducted on teacher engagement and motivation in relation to integrating educational technology in elementary school classrooms and is a needed area of study (Schweighofer & Ebner, 2015). Based on this need, the present study explores the impact of teacher engagement on student achievement in K-5 classrooms using a blended learning approach to reading instruction.
Blended Learning

The number of K–12 classrooms adopting blended learning models, integrating online and offline instruction, is rapidly growing (Horn & Staker, 2011). Blended learning, when implemented correctly, can be used as a way to support rather than weaken face-to-face instruction by providing teachers with access to data immediately (Freeland, 2015; Powell et al., 2015); this allows teachers to quickly gauge student progress and make informed pedagogical decisions to differentiate and personalize instruction (Cavanaugh, Sessums, & Drexler, 2015; Hilliard, 2015).

There are multiple models of blended learning including flex model (mostly online), enriched virtual model (mainly online and check-in with teacher), a la carte model (part of instruction online with the rest face-to-face instruction), and rotational model (small groups of students transitioning between different learning stations in a classroom or computer laboratory setting) (Horn & Staker, 2011). Blended learning in the early grades is most frequently achieved through a rotational model (Staker & Horn, 2012). For example, one station could be the online component of a blended learning program, while another station is designated for small-group instruction with a teacher or paraprofessional, and the remaining stations have students working independently at their seats or engaged in silent or peer-reading. Research shows that students who use a combination of online and face-to-face instruction perform better than their peers who only access content through one mode of instruction and that teacher involvement is a stronger mediator of success in a blended model than in online-only programs (Zhao, Lei, Yan, Lai & Tan, 2005). With the influx of digital devices and educational software into classrooms, students are becoming more self-directed learners, and thus teachers’ roles are changing. Teachers now see their role as a mentor, coach, or guide, rather than predominantly as a lecturer (Powell et al., 2015). Although implementing a successful blended learning model, as with other new curricula or pedagogy, should include professional development opportunities for teachers and administrators, trainings may be subject to budget and time limitations and are not always comprehensive and adequate (Darrow, Friend, & Powell, 2013).
It is essential that teachers are provided with sufficient training opportunities for positive student achievement outcomes (Darling-Hammond, 2000; Villegas-Reimers, 2003; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). The International Society for Technology in Education (ISTE) standards outline several best practices in the context of blended learning, including making technology an integral part of teaching and encouraging administrators to provide trainings so the technology can be used effectively in the classroom (ISTE, 2008). Goals of the blended learning program, expected outcomes, and resources invested should be clearly articulated, addressing the needs of all stakeholders—teachers, administrators, students, and parents (Hilliard, 2015; Moskal et al., 2013).

**Engagement and Motivation**

An expansive body of literature on teacher and student motivation and the connections between motivation and engagement provides a lens through which to examine how teacher engagement supports student motivation, engagement, and outcomes when implementing new technologies. The classroom environment created by the teacher can, at times, support student motivation and engagement while, at other times, undermine it (Reeve, 2012).

In order for innovative programs to be successful, teachers need to be engaged in both new educational practices as well as the related professional development opportunities. Whether teachers implement a new curriculum with enthusiasm or return to their traditional way of instruction depends on their perception of success (Abrami, Poulsen, & Chambers, 2004). Studies have found that teacher motivation, particularly intrinsic motivation (engaging in an activity because of an inherent interest rather than external factors) (Ryan & Deci, 2000) is an important predictor of successful implementation of new educational programs in classrooms (Abrami et al., 2004; Gorozidis & Papaioannou, 2011; Gorozidis & Papaioannou, 2014; Hanfstingl, Andreitz, Müller, & Thomas, 2011).

Within a school, teachers typically have similar working conditions, professional development opportunities, educational
resources, and other extrinsic factors, yet motivation and engagement varies. Self-determination theory (SDT) aims to explain and guide behaviors that increase motivation and engagement (Reeve, 2012). SDT focuses on the needs of autonomy (an internal sense of control), competence (feeling of success), and relatedness (connection to others) (Deci, Eghrari, Patrick, & Leone, 1994; Hanfstingl et al., 2011; Niemiec & Ryan, 2009; Rigby, Deci, Patrick, & Ryan, 1992; Ryan & Deci, 2000).

Using SDT to evaluate professional development initiatives, researchers found that, although both intrinsic (e.g., desire to learn more) and extrinsic (e.g., penalty for not attending) reasons existed for participating in professional development courses, only intrinsic motivation positively predicted teachers’ intentions to participate in trainings and to implement innovative curriculum in the future. It was concluded that training strategies for teachers must support intrinsic motivation to lead to successful implementations of new educational programs (Gorozidis & Papaioannou, 2014). The motivation mediation model of SDT also accounts for how aspects of intrinsic motivation in teachers can be used to predict student performance. According to the model, the degree to which teachers perceive that they have autonomy predicts student engagement in the classroom which, in turn, predicts learning outcomes (Hardre & Reeve, 2003; Jang et al., 2009; Vansteenkiste et al., 2010). For example, autonomy supportive teachers communicate with noncontrolling language that supports students’ interests and helps students understand the value of all aspects of their schoolwork (Reeve et al., 2004).

The SDT motivation mediation model has been validated across multiple classroom contexts (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Black & Deci, 2000; Jang et al., 2009; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005; Williams & Deci, 1996). The use of blended learning for instruction is consistent with SDT as it applies to student motivation and engagement. Blended learning can support autonomy through student-directed use of the online components of the program (Powell et al., 2015), and enhances competence by building students’ sense of mastery as they work on skills at the appropriate level of difficulty. The third area of SDT, relatedness, is
the factor most reliant on the teacher who develops the classroom culture as students work towards common goals and celebrate success.

**Current Study**

Teacher engagement and buy-in are key to successful implementation of new curriculum (Hardre & Reeve, 2003; Jang et al., 2009; Reeve et al., 2004; Vansteenkiste et al., 2010), however, as with the addition of any new curriculum to the classroom, the quality of implementation and level of stakeholder engagement can vary (Freeland, 2015). To better understand teachers’ actions in their blended learning classrooms, and the importance of teacher engagement, the current study explored how teacher engagement with a blended learning reading program can foster student engagement and positive learning outcomes in elementary school.

For this study, teacher engagement was defined in terms of voluntary participation in a usage contest (described in detail below). Teachers who chose to participate in the usage contest were considered more engaged with the blended learning program than teachers in the same school who did not participate, since they engaged with the program enough to be exposed to the contest participation opportunity and then self-select into participating. By examining the pre-, during, and postcontest behaviors of teachers, as well as program usage fidelity and student progress in the program, this study aimed to better understand the influence of teacher engagement on implementation of a blended learning reading program in elementary school. Teachers were also surveyed on their types of interactions with the blended learning program to further explore their level of engagement with the program.

**Usage Contest**

One of the greatest challenges in implementing a blended learning program is scheduling online use so that all students are provided with sufficient time to use the program. The blended learning program employed in this study varies usage
recommendations (targets) between 20 and 80 minutes per week, depending on a student’s risk level (i.e., how likely the student is to complete grade level materials by the end of the school year). Students with higher risk levels are assigned higher usage targets. Minutes of program use is often considered an indicator of program fidelity; however, if a classroom is allocated 40 minutes of computer time per week, all students may receive 40 minutes of online program use, even though the recommendation is 20, 40, 60, or 80 minutes. As part of a national year-long effort to increase the number of students meeting usage targets in the blended learning program (Lexia Reading Core5® [Core5]) classes were invited to participate in a “usage contest” in the winter of the 2014–2015 school year.

Participating classes throughout the nation competed to determine which ones could have students meet their usage targets with the highest consistency (e.g., all students in the class meeting their usage recommendation every week). A pizza party was offered as a prize for classes with the most points. Pizza parties were awarded to six classes at the conclusion of two, two-week contest rounds. In addition, the contest provided an opportunity for teachers to interact with one another and parents by sharing their success on social media for additional contest points.

Although the contest itself could be viewed as an external motivator, its inception provided researchers two key data points: (1) Responses to the announcement of the contest on the progress monitoring dashboard served as a measure of engagement, comparing teachers who were interested, goal-oriented, and actively involved in a task (e.g., providing students with enough minutes in the program) to teachers who were more apathetic to the contest or the dashboard itself (Reeve et al., 2004). (2) The timing of the contest allowed for a baseline of 3 prior months of program use for comparison to 3 months of program use which included the usage contest.

**Research Questions**

This study examined whether teacher engagement with the blended learning reading program (as defined by participation
in a usage contest) leads to greater reading gains for students of more engaged teachers (participants) compared to students of less engaged teachers within the same schools (non-participants). Data from the blended learning program were collected to determine the following: (1) Does teacher engagement (as measured by contest participation) lead to differences in (a) program usage time and (b) student progress in participating classes compared to students in neighboring nonparticipating classes? (2) In what ways, if any, does teacher engagement (as measured by contest participation) relate to increased usage of key implementation monitoring tools in the blended learning program?

Method

Student usage and progress in the blended learning program were analyzed for students from contest-participating classes (participants) compared to students from other classes using the blended learning program in the same schools but their teachers chose not to participate in the usage contest (nonparticipants). Since student risk levels (and corresponding usage recommendations) are often related to fidelity of program use and progress, risk level served as a control variable in the analyses. To further understand how participation in the usage contest related to teachers’ implementation of the blended learning program, participating teachers were given an opportunity to complete a survey addressing their use of implementation monitoring tools offered by the program.

Sample

Participants in the study were teachers and students from schools that used the blended learning program during the 2014–2015 school year. Teachers were invited to participate in a usage contest by a banner on the implementation monitoring dashboard that remained present from two weeks before the contest up through the final week. The banner read: “Enter the Usage Contest to win a pizza party: (link to Usage Contest website).” Teachers could view the banner
whenever they logged into the implementation monitoring dashboard. An invitation to enter the contest was also posted on social media accounts (Facebook, Twitter, Google+ and LinkedIn) starting in late February. Variations of the invitation were posted, on average, twice a week for the duration of the contest.

To be included in the study as a participating class, students had to use the online component of the program for two time periods during the 2014–2015 school year—before the usage contest (October-December) and during the contest (January-March). Classes from schools who had contest-participating classrooms, but were not participating in the contest, were included in analyses as nonparticipating comparison classes. Students in the study came from 764 schools across the United States. Within these schools, 1,440 classes participated in the usage contest. There were 19,366 students in these participating classes (participants). Students from the same schools who used the blended learning program during the same time period (October-March) but did not participate in the usage contest served as a comparison group (non-participants). There were 171,850 students in the comparison group. The distribution of students across kindergarten to fifth grade classes was similar for the participating and non-participating groups, as shown in Table 1 below, which outlines the study sample by grade.

**Study Tools**

**BLENDED LEARNING PROGRAM (CORE5)**

The blended learning program implemented in this study was *Lexia Reading Core5® (Core5)*. It is an adaptive program for Pre-K through grade five comprising student-directed online activities and teacher-implemented offline lessons and enrichment activities. The program delivers an explicit, systematic, and individualized curriculum that is aligned to the Common Core State Standards in reading (corestandards.org) by grade level. The 18 levels of material included in the online component provide instruction in phonological awareness, phonics, structural analysis, automaticity/fluency, vocabulary, and comprehension. The program provides scaffolding and immediate feedback across 1,243 skill-based units designed to support struggling students’
advancements as well as sustain and enhance the skills of on-level and above-level students. Teachers are provided with data-driven action plans based on students’ real-time performance. These plans recommend teacher-led lessons and paper-and-pencil activities to differentiate instruction. The program’s implementation dashboard provides student usage information and progress reports at the teacher, school, and district administration levels.

An integral part of the blended learning program is meeting individualized recommended weekly usage targets. The program provides usage targets which adapt based on students’ performance in the program during the previous month. Students are assigned 20–80 minutes of program usage per week depending on their risk level (i.e., how likely they are to complete grade level materials by the end of the school year).

IMPLEMENTATION DASHBOARD

In the survey distributed for this study, self-reported use of the implementation dashboard (myLexia) served as one indicator of teacher engagement with the blended learning program. The dashboard reports contain data on program usage, each student’s accuracy and progress in completing activities in the program, and information regarding the student’s strengths and weaknesses in specific reading skills. Teachers can utilize the implementation dashboard to monitor and target instruction to a specific skill or skills offline for students who need extra support, which ensures that students are productively using the program when online.

| Grade | Total Sample | Participants | Non-Participants |
|-------|--------------|--------------|-----------------|
|       | N            | %            | N               | %              |
| K     | 32174        | 3403         | 17.6            | 28771          | 16.7           |
| 1     | 38886        | 4047         | 20.9            | 34839          | 20.3           |
| 2     | 38020        | 3944         | 20.4            | 34076          | 19.8           |
| 3     | 33967        | 3762         | 19.4            | 30205          | 17.6           |
| 4     | 27762        | 2481         | 12.8            | 25281          | 14.7           |
| 5     | 20407        | 1729         | 8.9             | 18678          | 10.9           |
| Total | 191216       | 19366        | 10.9            | 171850         |                |
Monitor student program usage. When teachers log into the implementation dashboard, they are presented with their whole class overview report. This page includes a class roster that indicates each student’s usage data including his/her weekly usage target, time on the program during the current week, and an indicator if each student reached his/her target the previous week. Students who need immediate support are flagged with links to scripted lessons for teachers to provide on the specific skill area of need.

Assessing students’ individual needs. Each student has an individualized report which provides the teacher with up-to-date performance and usage data over the school year. Teachers can use the included action plan to determine the specific units on which the student is struggling and to access relevant lessons and activities for individual or group instruction. Detailed student usage information for the current week, the last four weeks, and the entire year are also on the student report.

Through the implementation dashboard, teachers have access to a resource library with over 340 lessons and 430 pages of pencil-and-paper independent activities. Lessons help students with immediate instructional needs so they can progress in the online skills. The pencil-and-paper activities reinforce ideas from completed online skills and help build automaticity. By utilizing these materials, teachers can maximize student productivity online and help ensure the transfer and extension of skills from the blended learning program to other reading tasks.

Tracking student progress. These methods of tracking student progress give teachers formative assessment information while students work each day. Formative assessment is a method that teachers use to gather data on their students’ current progress and inform instruction. The implementation dashboard that teachers were surveyed about in this study provides teachers with up-to-date reports for ongoing formative assessments, as well as the resources to use assessment data to adapt and personalize instruction. A progress graph depicts a student’s growth each month and provides an end-of-year benchmark, which corresponds to a student completing all materials for his or her grade level. Teachers can also view the percent of completion for each activity in
the student’s current program level (i.e., the number of units the student completed divided by the total number of units in that activity, usually between 10 and 20 units). For students working far below grade level, other program-level markers can be used as progress targets (i.e., number of units or activities completed).

**Study Measures**

To evaluate if teachers’ participation in the usage contest had an effect on student performance in the blended learning program, student online usage and progress data in the program were analyzed to compare behavior between participating classes and non-participating classes prior to and during the usage contest.

**TIMING**

The time point indicator was coded as a binary variable, where 0 is before the usage contest (October–December), and 1 is during the usage contest (January–March).

**USAGE AND PROGRESS**

Student usage data includes students’ weekly usage recommendations and their actual minutes of use for those corresponding weeks. These data were used to classify students as ‘meeting usage’ or ‘not meeting usage’ each week. The final meeting usage indicator is defined as the percent of weeks students met their usage recommendations during each three month time period (0–100%). Student progress data consist of the total number of program units completed online (maximum 1,243) during each time point (before or during the contest).

**PARTICIPATION**

The participation indicator was coded as a binary variable, where 0 indicates a student in a non-participating class (non-participants) and 1 indicates a student from a participating class (participants).
RISK LEVEL

Students’ usage recommendations are updated monthly based on the likelihood of reaching end-of-year benchmark in the blended learning program. Usage recommendations range from 0 to 80 minutes, with higher risk students having higher recommendations. Therefore, a risk level between 0–80 was calculated for each student by taking an average of students’ six monthly usage recommendations across the two time periods, three from each time period. For example, if a student’s usage recommendation was 40 in October, 50 in November, and 60 in December, risk level for that time period was 50. The risk level served as a control variable when comparing performance measures for participating and non-participating students for each of the two time periods. Before the contest, the average risk value was similar for non-participants (46.95) and participants (46.06).

USAGE CONTEST SURVEY

A usage contest survey was created to gather feedback from participating teachers on how the usage contest, designed to increase engagement with the blended learning program, impacted their use of the implementation dashboard. Responses to open-ended questions from a previously delivered survey to frequent program users were analyzed using pattern analysis (Miles & Huberman, 1994) to identify four common behaviors associated with the implementation dashboard. Questions were designed as retrospective items, which is recommended for reflecting on the impact of a teacher education experience (Pratt, McGuigan & Katzev, 2000). For each of the four common implementation behaviors, assessing student needs, monitoring student usage, tracking student progress, and adapting lesson plans based on student data, teachers were asked (yes or no) to respond whether or not they engaged in that behavior weekly before, during, and after the usage contest.

The survey was sent on three occasions in May, each one week apart, to the 1,440 participating teachers of the usage contest. Teachers received a follow-up email if they did not click the survey link in the prior email(s). Responses were obtained from 154 teachers (See Appendix A for a list of survey questions).
Analysis Plan

Analyses sought to explore the impact of teacher engagement—as defined by participation in the usage contest—on student performance when using a blended learning program. A linear regression analysis was used to examine if student usage and progress in the blended learning program differed for participants compared to non-participants. Time point (before versus during the usage contest) served as a predictor variable and risk level as a control variable. The reported models include only significant predictor and control variables. Students with valid outcome measures (program usage and progress) had no missing data on other indicators. As a result, no additional missing data analyses were conducted. In addition, to assess the relationship between teacher engagement and implementation behaviors, an analysis of variance (ANOVA) was used to compare survey results tied to behaviors before, during, and after the usage contest.

Results

Meeting Usage

The first analysis examined the relationship between meeting usage recommendations and contest participation. Average percent of weeks meeting usage before and during the usage contest is shown comparing participants and non-participants in Figure 1. Results indicate that both before and during the contest, participants met their weekly usage recommendations more often than non-participants. An analysis of covariance (ANCOVA) indicated that in the Before Contest time point, participants met usage recommendations for a significantly higher percentage of weeks than non-participants (65.1% vs. 52.6% on average), even when controlling for student risk level ($F(1, 191213) = 2254.137, p < .001$). An ANCOVA indicated similar findings for the During Contest time point, where participants met usage recommendations for 68.6% of the weeks on average while non-participant met usage recommendations for only
51.8% on average, again controlling for risk level (\(F(1, 191213) = 3724.422, p < .001\)).

A linear regression analysis, controlling for students’ risk level, examined the relationship between contest participation and meeting usage recommendations over time. Meeting usage recommendations improved more for participants than non-participants between the two time points examined (4.6 vs. 1.9 percentage point increase, controlling for student risk level). Model information can be found in Table 2. The \(F\) statistic for the overall model was 41656.537, with a \(p\)-value <.001, showing that the model is significant. As indicated by the parameter estimates outlined in Table 3, controlling for students’ risk levels, there was a significant interaction between contest participation and time point (\(F(1, 382,431) = 64.81, p < .001\)), meaning that participants showed a greater improvement in meeting usage recommendations than non-participants from before to during the contest.

**Units Completed**

Increased consistency in meeting usage recommendations translated to completing more units in the online component of the blended learning program. Overall, participants
completed more units in each time period (before and during the contest) than non-participants. Before the usage contest, participants completed 98 units on average compared to 79 units for non-participants. During the usage contest, participants completed an average of 114 units compared to 85 for participants\(^1\). The \(F\) statistic for the overall model was 3260.728, with a \(p\)-value < .001, indicating that the model fit is significant. Model fit information can be found in Table 4.

Linear regression was used to examine whether there was a significant difference in the number of units completed by time period for participants as compared to non-participants (\(N = 382432\)). Controlling for students’ risk levels, there was a significant interaction between contest participation and time period (\(F(1, 382431) = 153.41, p < .001\)). These results, as shown in Figure 2, indicate significantly more units were completed during the usage contest than before the contest for participants in comparison to non-participants.

Contest Survey

The contest survey sought to understand how teachers’ participation in a usage contest, designed to foster classroom-wide community engagement with the blended learning program,
impacted their use of the implementation dashboard. Results from the survey indicated that for some aspects of implementation, teachers did not believe their behavior changed before, during, or after the usage contest. A majority of teachers stated they used program supplied offline lessons before (82%), during (82%), and after (87%) the usage contest. Similarly, nearly all teachers stated they checked student usage information online regardless of the timing of the contest (95% before, 94% during, 96% after). ANOVA tests confirmed that the differences between time points in self-reported offline lesson use and student usage monitoring were not significant.

Teachers’ self-report of evaluating their students’ gains and progress online took a dip during the contest. Before the contest, 89% of teachers reported checking their students’ gains online and 95% reported they checked their students’ gains online after the contest. However, only 37% reported they checked gains online during the contest ($F(2, 480) = 129.766, p < .001$). Post hoc comparisons using the Tukey HSD test confirmed that the proportion of respondents who reported checking students’ gains online was lower during the contest compared to both before and after the contest.

### TABLE 3 Parameter Estimates Table for Meeting Usage Targets

| Parameter          | B   | SE   | $p$ value |
|--------------------|-----|------|-----------|
| Constant           | 1.145 | .003 | .000      |
| Participation      | .144 | .002 | .000      |
| Timing             | .046 | .003 | .000      |
| Risk Level         | -.010 | 2.436E-5 | .000 |
| Participation*Timing | .027 | .003 | .000      |

### TABLE 4 Test of Between Subjects Effects for Meeting Usage Targets

| Source              | Type III Sum of Squares | Df | Mean square | $F$  | One Tailed Significance |
|---------------------|-------------------------|----|-------------|------|-------------------------|
| Corrected Model     | 67424993.876            | 4  | 67424993.876 | 3260.728 | .000                   |
| Intercept           | 677155579.454           | 1  | 677155579.454 | 130991.190 | .000                   |
| Participation       | 20173964.230            | 1  | 20173964.230 | 3902.518 | .000                   |
| Timing              | 4467987.452             | 1  | 4467987.452 | 864.302 | .000                   |
| Risk Level          | 41162546.237            | 1  | 41162546.237 | 7962.618 | .000                   |
| Participation*Timing| 793051.350              | 1  | 793051.350 | 153.410 | .000                   |
(\(p < .001\)), while before the contest did not differ from after the contest.

Despite reporting a dip in using the implementation dashboard to monitor student progress online, teachers self-reported an increase in adapting their lesson plans based on the implementation monitoring dashboard data. When reflecting on behavior before the contest, only 50% indicated that they adapted their lesson plans, compared to 58% during the contest and 65% after the contest. These differences in self-reported lesson plan adaptations were significant (\(F(2, 480) = 3.70, p < .03\)). Post hoc comparisons using the Tukey HSD test indicated that the proportion of respondents who reported they adapted their lesson plans before the contest was significantly lower than the proportion who reported adapting lessons after the contest (\(p < .05\)). Self-reported

![FIGURE 2 Estimated marginal means for change in units gained over time.

TABLE 5 Parameter Estimates for Units Gained

| Parameter            | B     | SE  | \(p\)-value |
|----------------------|-------|-----|-------------|
| Constant             | 137.900 | .579 | .000        |
| Participation        | 28.855 | .545 | .000        |
| Timing               | 16.107 | .731 | .000        |
| Risk Level           | -.493  | .006 | .000        |
| Participation*Timing | 9.547  | .771 | .000        |
lesson plan adaptations during the contest did not significantly differ from either before or after the contest.

**Discussion**

This study demonstrated with a large national sample that teacher engagement can significantly affect student usage and progress within a blended learning reading program. Students of engaged teachers (i.e., those who enrolled their class in the usage contest) significantly increased their fidelity of program use by meeting their weekly usage targets more often than students of non-participating teachers. Consequently, participants had more time to complete reading units in the program than non-participants due to their higher usage fidelity. As this study used participating and non-participating classes from within the same schools, it is likely that other aspects of the school environment—curriculum, professional development, administrative support—did not differ between participants and non-participants. Comparison of outcomes for participants compared to non-participants is consistent with prior research that indicates students of engaged teachers perform better than students of less engaged teachers (Darling-Hammond, 2000; Hardre & Reeve, 2003; Jang, Reeve, Ryan, & Kim, 2009; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Vansteenkiste, Niemiec, & Soenens, 2010).

An examination of pre-contest baseline differences between participants and non-participants indicate that teachers who participated in the contest, on average, were more engaged with monitoring fidelity of use to start than non-participants. These findings reinforce the theory that engaged teachers supported the achievement of their students before the contest.

A survey was developed to assess implementation behaviors of teachers who opted-in to the contest and learn more about how teachers engaged with the educator-focused blended learning tools, such as the implementation dashboard (myLexia) and offline instructional materials. Interestingly, teachers’ self-reported monitoring of their students’ gains and progress on the implementation dashboard took a
dip during the contest, even as their reported behaviors in monitoring usage and use of offline lessons did not vary. This dip is possibly due to an increase of teacher engagement with students as they worked in the classroom as teachers were more intently focused on their students meeting individual usage targets. As participating teachers were even more engaged with their students using the program, they could see their students earning certificates within the program in real time and were therefore more aware of their students’ progress without logging into the implementation monitoring dashboard. In addition, students may have been communicating their progress in the blended learning program more vocally as the culture in the classroom increased focused on program usage during the contest.

Even though the contest participating teachers reported a dip in using the implementation dashboard to monitor progress during the usage contest, they self-reported an increase in adapting lessons based on their students’ data during and after the contest. This increase may be due to more teachers learning to locate program data more quickly and becoming more adept at using the provided resources as a tool for differentiating instruction. Additionally, students were completing units at a higher rate during the contest and feeding more evaluative data into the dashboards, which may have made it easier for teachers to adapt lessons on a weekly basis.

Research indicates teacher quality and professional development impact student achievement outcomes (Darling-Hammond, 2000; Yoon et al., 2007). In particular, teachers trained based on self-determination theory tend to be more autonomy-supportive of their students and display more engagement in their classrooms (Reeve et al., 2004). Participating teachers likely enrolled their classrooms to participate in the usage contest due to self-determined factors to a greater extent than external rewards (Gorozidis & Papaioannou, 2014) and were able to better support their student’s motivation and success in the blended learning program by fostering relatedness, autonomy, and competence for students in their classrooms. As evidenced by comparisons in learning outcomes between participants and non-participants, this study continued to demonstrate that engaged teachers have higher achieving students than less engaged
teachers and this trend persists when implementing a blended learning program.

**Implications**

This study contributes to the literature by demonstrating with a large national sample of students that teacher engagement had a significant impact on student progress within a blended learning reading program. This study confirms the importance of engaged teachers on student outcomes and argues for future explorations of how to best support and develop teacher engagement through professional development and teacher training programs, especially when integrating new technologies into the classroom. Professional development programs that provide an environment where teachers believe they can successfully implement innovative programs in their classrooms (Abrami et al., 2004) and foster autonomy-supportive behaviors (Reeve et al., 2004) are of particular importance when implementing new classroom programs (e.g., blended learning).

**Limitations**

Although there was a large set of student data to assess reading gains for both participants and non-participants, the data were limited to performance in the blended learning program, Core5. Performance measures from Core5 are correlated with outside reading measures (see Appendix B), however, data was not collected on outside measures from students included in data analysis in this study, given the very large number of students and varied locations of schools across the United States in the sample. In addition, this study was conducted during one school year only. Future studies should track long term data to evaluate the sustainability of the teacher engagement effects when the students change grades and classrooms.

Given that participants in this study were self-selected, there are other limitations. Survey response data are restricted to teachers who both enrolled in the contest and chose to complete the survey. Given that less than 15% of participating teachers responded to the survey, it is possible that findings
from the survey do not capture aspects of program implementation for the full set of engaged teachers.

While this study provided useful insight into teachers’ engagement with a blended learning program and the impact of engagement on student outcomes, questions still remain of how to recruit and sustain teachers’ use of the blended learning program to support student engagement and subsequent learning outcomes. Perhaps mandatory participation in quality professional development for the blended learning programs and/or general professional development to support self-determined qualities (i.e., autonomy, competency, relatedness) in the classroom are solutions that warrant further study.

**Conclusion**

This study demonstrated that when teachers are engaged in the implementation of a blended learning reading program as designed, their students accomplish more in the program than the students of neighboring teachers who are less engaged. When teachers who were already implementing the blended learning program with fidelity participated in a usage contest they were able to further improve their program implementation and student outcomes in the program compared to students of the teachers next door. Teachers responded that they more readily adapted instruction following participation in the usage contest, which is an essential element of a blended learning program.

While prior studies on teacher engagement and self-determination theory suggest that teachers who are already engaged teachers were the ones most likely to participate in the usage contest, this study adds to the literature on the importance of teacher engagement for student gains, by both demonstrating greater reading gains for participants and doing so within a blended learning environment. As school districts and teachers are adopting new technologies and blended learning programs into their classrooms, it is essential to understand how educator’s motivational attributes impact learning gains for their students.

In sum, this study is informative for the design of blended learning programs and stresses the importance of consistent
implementation for student gains. The results point to a need for developing ways to continue to support engaged teachers while finding ways to engage more reluctant to adopt teachers. Technology integration alone is not enough—knowledgeable, trained teachers who are afforded the opportunity to self-reflect, evaluate, and alter their pedagogy accordingly, are essential for the proper use of new technological tools and blended learning programs in their classrooms.

Declaration of Interest

This submission evaluates the effectiveness of a commercial product. Four authors of this paper are employed by Lexia® Learning, A Rosetta Stone® Company, and one serves as a paid consultant and is employed by Community College of Rhode Island. None of the researchers receive commission on sales of the products. Teachers and school personnel carried out the implementation of the program.

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Appendix A

Usage Contest Survey

SOCIAL MEDIA USAGE AND PIZZA CONTEST — FOLLOW-UP

We would like to know more about your experience with the usage contests this year. All answers will remain anonymous. Thank you for sharing your stories!

Q1. Did you participate in the contest during the:
   - Fall
   - Spring
   - Both the Fall and Spring

Q2. What motivated you to participate in the contest?
   (e.g., the pizza reward, a focused timeframe, competition, other reasons?)

Q3. BEFORE the contest(s), how many of the following actions did you do WEEKLY?
   - used Lexia Lessons or Skill Builders
   - checked student’s usage information
   - adapted your lesson plans based on myLexia data
   - evaluate student gains and progress online
   - I didn’t do any of these things on a weekly basis
   - Other:

Q4. DURING the contest(s), how many of the following actions did you do WEEKLY?
   - used Lexia Lessons or Skill Builders
   - checked student’s usage information
   - adapted your lesson plans based on myLexia data
   - evaluate student gains and progress online
   - I didn’t do any of these things on a weekly basis
   - Other:

Q5. SINCE or BETWEEN the contest(s), how many of the following actions do/did you do WEEKLY?
   - used Lexia Lessons or Skill Builders
   - checked student’s usage information
   - adapted your lesson plans based on myLexia data
   - evaluate student gains and progress online
- I didn’t do any of these things on a weekly basis
- Other:

Q6. Anything else you’d like to share with us about the contest, myLexia, or Lexia in general?
Q7. If you are open to answering more questions or would like to give feedback on new myLexia features, please include your email below (optional)

Appendix B

**TABLE B1** Correlations between Core5 Benchmark Status and End-of-Year Scores on Progress Monitoring Tools

| Progress Monitoring Tool  | N  | K  | 1  | 2  | 3  | 4  | 5  |
|---------------------------|----|----|----|----|----|----|----|
| aimsweb                   | 1,796 | —  | .6 | .6 | .6 | .5 | .5 |
| DIBELS Next               | 10,347 | .6 | .7 | .6 | .6 | .6 | .6 |
| MAP                       | 4,577 | .4 | .5 | .5 | .5 | .6 | .5 |
| STAR Early Literacy       | 779  | .2 | .5 | —  | —  | —  | —  |
| STAR Reading              | 2,674 | —  | —  | .5 | .5 | .6 | .6 |

Notes. Correlations can be categorized into three ranges: High = .7 – .9, Medium = .4 – .6, and Low = 0 – .3. Sample sizes are collapsed over grades.