Working Knowledge: An Analysis of Innovation in K-6 Charter Schools

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Working Knowledge: An Analysis of Innovation in K-6 Charter Schools

Jennifer Lynn Price

A dissertation submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy

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ABSTRACT

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Doctor of Philosophy

This three-article dissertation explores educational innovation in charter schools. A common frame of reference for each article is the consideration of the influence of Dr. Benjamin Bloom’s 2 sigma problem—the observation that one-on-one tutoring, though often cost prohibitively expensive, produces outcomes two standard deviations higher than traditional group-directed instruction. The first article is a literature review of the types of charter school innovations most commonly found in the literature and the type of effect those innovations can have on student learning outcomes. The research suggests that three of the top studied new innovations from charters are technology-based virtual schools, specific curricular immersion programs, and the implementation of extended learning hours. Successful student learning outcomes are most likely when implementations are well planned, proper training is provided, and appropriate resources are allocated to the program.

The second article is a design-based case study of the development of Franklin Discovery Academy, a K-6 charter school located in Vineyard, UT. We review two of the key design decisions made by our group of graduate students in instructional design in the development of the school and the outcomes of those choices. We focus on the design decisions involved in formulating the student learning model, which included a high school-like rotation of classes at an elementary school level, and the differentiated teacher model design, where the functions of the teacher are separated into three distinct job roles based on economy-of-scale principles. We describe why we made the choices we did, how they were implemented, what went right, and what went wrong. We detail the importance of flexibility and having the right people to developing a resilient and innovative culture.

The final article is a quasi-experimental study on the effectiveness of the FoxesRead virtual tutoring program at Franklin Discovery implemented during the Covid-19 pandemic. In response to the pandemic-related school shut-down, Franklin Discovery provided virtual one-on-one tutoring to students during June 2020. Using a split-plot ANOVA statistical analysis, we compared the reading pre- and post-reading scores for participating students to nonparticipants. With our analysis, we found a large .309 effect size attributed to the FoxesRead program. Qualitative data collected from parents and tutors also provided strong positive feedback. The findings suggest that FoxesRead is an effective education innovation.

Keywords: charter schools, elementary education, tutors, tutoring, educational innovation
ACKNOWLEDGMENTS

This dissertation is dedicated to my children, Lance and Lexi, and my husband Jerry. Without their incredible patience, support, and sacrifice, this long journey would not have been possible. Lance and Lexi–Mommy can play now.

I also offer heartfelt thanks to all the individuals who have helped bring this dissertation to reality: Dr. Heather Leary for being an incredible committee chair, mentor, and guide; and my supportive committee members, Dr. Randy Davies, Dr. Jason MacDonald, Dr. Ken Plummer, and Dr. Ross Larsen. I would also like to thank the other founders, staff, parents, and students of Franklin Discovery Academy who made much of this research possible.
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DESCRIPTION OF RESEARCH AGENDA AND STRUCTURE OF DISSERTATION

This dissertation, *Working Knowledge: An Analysis of Innovation in K-6 Charter Schools*, is written in a three-article format. Each article is journal ready and formatted for submission, while also meeting traditional dissertation requirements. The preliminary pages of the dissertation reflect requirements for submission to the university. This dissertation report is presented as three journal articles, and they conform to length and style requirements for submitting research reports to education journals.

The guiding framework for all three articles is a focus on charter schools and innovation through a lens of Dr. Benjamin Bloom’s 2 sigma challenge to find methods of affordable group instruction that are as effective as one-on-one tutoring (Bloom, 1984). Bloom’s research suggests that nearly all students are capable of top academic achievement when provided with mastery-based, one-on-one tutoring. Recognizing that large-scale tutoring is cost-prohibitive along with an acknowledgment of general problems in education leading to low student achievement, the need for innovative ideas in education that can be efficiently implemented and produce effective results has perhaps never been greater.

This research aims to explore recent charter school innovations and how effective they are through a general literature review, as well as provide more specific examples from a charter school in Utah of the design decisions leading up to its formation and the outcome of a subsequent innovation. It is hoped that through these articles, practitioners, and researchers alike can draw insights and ideas on implementing charter school innovations that improve student learning outcomes.

The first article, *Teaching and Learning at Charter Schools: A Review of Three Best Practices*, is a literature review synthesizing research findings related to innovation practices in
charter schools by reviewing 20 years of charter research. Charter schools exist, according to proponents, to more quickly experiment with innovation changes to educational models. This review of the literature asks the questions of which types of innovations are most common and are there any documented benefits to learning outcomes. A cursory review of more than 792 research articles led to a more detailed synthesis of 102 papers focusing on innovations in technology-based instruction, specific curricular immersion, and extended learning time programs. The research suggests that each of these innovations can have a positive effect on learning outcomes if implementations are well executed.

The second article, Innovating at Charter Schools, is a design case study that looks at the design decisions made by a group of instructional design graduate students as they formulated and designed a new charter school, Franklin Discovery Academy in Vineyard, Utah. A design case is a rich description of the design process and what was created (Howard et al., 2012). It tells the story of how the design process started, the context for the design, decisions that were made and why, surprises and challenges encountered along the way, as well as the product created. Design cases expose patterns and tensions in the design process and are essential for understanding the process and final product. Ultimately, design cases are about building knowledge related to design so that others can understand all the factors involved in a specific design process and product.

This design case study looks at two of the main decisions the team made, why they made them, how they were implemented, what went right, what went wrong, and the influence of Dr. Bloom’s 2 sigma problem. The focus of this article is on the design decisions involved in formulating the student learning model, which included a high school-like rotation of classes at
an elementary school, and the teacher model design, where the functions of the teacher were separated into three distinct job roles based on economy of scale principles.

The final paper, *Charter Schools and Innovation: A Research Study on a Virtual Summer Reading Program for K-6 Students Following School Shutdown for Covid-19*, is a quasi-experimental research study analyzing the effect of Franklin Discovery Academy’s “FoxesRead” program, a one-on-one virtual tutoring program implemented “on the fly” during the spring 2020 coronavirus pandemic school shutdowns. The FoxesRead tutoring program was primarily a response to a quickly changing and challenging situation but was also an attempt to bring current school practice into philosophical alignment with tutoring as championed by Bloom and adopted by the school’s founders. The paper describes the implementation of the FoxesRead intervention followed by an analysis of student learning outcome results. Research data is gathered from reading test score results, parent and tutor surveys, and focus groups.

These three papers, while weaving together themes of charter school innovation and Bloom’s 2 sigma problem, paint a picture of how charter schools can successfully implement innovative practices. Charter school innovation can take on multiple forms, but the research points to the importance of balancing an effective design with a well-planned execution. Bloom’s challenge suggests innovative practices can help solve the problem of providing expensive one-on-one tutoring. This dissertation presents practitioners and researchers with practical examples and solutions for leading innovation efforts in charter schools and improving student learning outcomes.
ARTICLE 1

Teaching and Learning at Charter Schools: A Review of Three Best Practices

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Abstract

This literature review analyzes research on school-level innovations at charter schools. Charter schools are a relatively new educational phenomenon in the United States with the oldest charters dating from the late 1980s. Charter schools have become a charged political topic as educators have sought to find solutions to problems of low student test scores, graduation rates, and college-readiness. Politicians, administrators, unions, teachers, and parents have argued whether charters merely take away funding from traditional public schools or whether they have a positive effect on students. This review pulls from research that shows, in general, charters can have positive effects on students when educational programs are implemented appropriately. The research indicates that three of the top studied new innovations from charters are technology-based virtual schools, specific curricular immersion programs, and extended learning hours. All three practices can have positive effects on student learning outcomes when implementations are well planned, proper training is provided, and appropriate resources are allocated to the program.

Keywords: charter school, elementary education, education innovation
Introduction

The year 2014 was expected to herald a new era for United States K-12 education, that of grade-level proficiency in reading and math for 100% of students (New America Foundation [NAF], 2013). In response to a public outcry that American education was failing, a bipartisan Congress passed the No Child Left Behind Act (NCLB) in 2001 (NAF, 2013). In advocating for his signature legislative piece that he signed in January, 2002, President George W. Bush claimed, “In a constantly changing world that is demanding increasingly complex skills from its workforce, children are being left behind. It doesn’t have to be this way” (No Child Left Behind, 2002, p. forward). The act mandated standardized testing as a way to measure progress toward the requirement that 100% of all public-school children demonstrate grade-level math and reading proficiency by the year 2014 (Mills, 2008; NAF, 2013).

So, how did the United States do? In 2003, 29% of public school eighth graders tested grade-level proficient in mathematics (National Center for Education Statistics [NCES], 2005). Sixteen years later, in 2019, a slightly improved 34% did (NCES, 2019). In 2003, 30% of public school fourth graders tested proficient in reading (NCES, 2005). By 2019, that number had nudged up to only 34% (NCES, 2019). Despite “the largest intervention of the federal government into education in the history of the United States” (Hursh, 2007, p. 295) since the No Child Left Behind Act, test scores are only slightly up—and nowhere in sight of the 100% goal.

The number of studies and reports documenting student performance in crisis appear endless. The Organization for Economic Cooperation and Development (OECD) reported that during the 1940s and 1950s, the United States had the best high school graduation rate in the world. By 2019, the U.S. had dropped to 11th (OECD, 2020). Some 1.1 million students drop out of school every year. Only 25% of graduating seniors graduate ready for college in the core
subjects of English, reading, math and science (OECD, 2020). Many studies show U.S. students lagging behind their international peers in all subject areas and at all grade levels. The federally funded National Center for Education Statistics (NCES) produces a yearly statistical analysis, “the nation’s report card.” Provasnik analyzed the data to show U.S. 15-year-olds were behind 23 of 29 studied countries in mathematics, behind 16 other countries in science, and behind 9 in literacy (Provasnik et al., 2009). Although some of the international comparison statistics may be skewed based on how each country does their testing, the trend shows U.S. students falling further behind on a year-over-year basis using the same statistics (Provasnik et al., 2009; Provasnik et al., 2019).

In this somewhat panicked environment of the declining state of U.S. K-12 education, politicians and researchers alike have often latched onto a 1984 paper by education researcher Benjamin Bloom as evidence that solutions are within reach. In *The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring*, Dr. Bloom (1984) presented evidence that with the ideal educational setting virtually all students could perform A level work. His results showed that students tutored in a one-on-one setting under mastery-learning techniques outperformed 98% of students in traditional group classroom settings. These results equate to a 2 sigma¹ improvement in learning outcomes. To put a 2 sigma result in perspective, if all 15-year-old U.S. students improved mathematics performance to just a 1 sigma degree, the U.S. would go from 23rd to first in the 2019 NCES report referenced above (Provasnik et al., 2019).

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¹ The style of use of the term “2 sigma” is varied in the literature, with some spelling out the two or using a hyphen. In the title of Dr. Bloom’s article, and throughout his article, he styles it “2 sigma.” We have adopted his style throughout.
Dr. Bloom’s 1984 paper suggested that education could be fixed and done well, if only we could figure out how to pay for the expense of one-to-one tutoring for all or figure out a cost-effective alternative to one-to-one tutoring that was just as effective. In effect, his paper was a call to action for finding an educational method that would produce the 2 sigma result in an affordable and realistic way. He asked, “Can researchers and teachers devise teaching-learning conditions that will enable the majority of students under group instruction to attain levels of achievement that can at present be achieved only under good tutoring conditions?” (Bloom, 1984, p. 4-5). Although Bloom (1984) suggested that either finding a new educational method or figuring out how to afford widespread tutoring was acceptable, he suggested that finding new educational methods was the more likely solution.

Over 35 years since Bloom’s (1984) challenge, educational researchers from all corners of the globe have attempted to solve the problem but have yet to provide a generalized solution. Interest in his paper remains high though, with some 1,730 citations in research papers in the last 9 years (Google scholar search results). With its unmatched 2 sigma effect, many in the educational community have accepted the outcomes of one-on-one tutoring as the ideal against which others should be judged. Dr. Bloom’s 1984 call to action provided the spark for a variety of initiatives across the educational spectrum that focus on innovation, with some having tried to solve the problem with technology and artificial tutoring systems (Levin, 2017; Wenger, 1987). Although Bloom (1984) looked to technology as a possible way to solve the problem, Bloom left open the possibility that the solution could come in any form. References to Bloom’s two-sigma problem occur in research papers on an array of other topics, from mastery learning to MOOCs to gamification to charter schools.
In 1991, in this environment where parents, politicians, and educators were clamoring for something new that could potentially improve education, came the first charter school law in Minnesota (Urahn & Stewart, 1994). A basic premise of the charter school movement was that charter schools could experiment with new or innovative strategies in ways traditional public schools could not (Han & Keefe, 2020; Nathan, 1997). By being able to quickly implement effective strategies or drop ineffective ones, charter schools would be able to improve student learning and lagging test scores. Teaching and learning strategies shown to improve outcomes could then be adopted elsewhere.

Proponents of charter schools contend that freedom from bureaucratic control and an ability to quickly implement new teaching strategies and methodologies makes charter schools best positioned to solve the educational crisis (Blazer, 2010). With their increased autonomy, charters can take up the call to innovate and find solutions to the 2 sigma problem and other educational issues.

Since the first Minnesota charter school opened in 1992, the total number of charter schools has grown to 7,500 nationwide with some 3.3 million enrolled students in the 2018-19 school year (National Alliance for Public Charter Schools [NAPCS], 2019). Charter schools were cited in the No Child Left Behind Act as one of the ways to help reform and improve public schools by “expanding flexibility” and “reducing bureaucracy” (NCLB, 2002, p.4). Despite the public resources that have gone into funding these thousands of charter schools, results documenting their effectiveness have been mixed (Baude et al., 2020; Betts & Tang, 2011) and none have been able to document solutions for Bloom’s 2 sigma problem (1984).

Part of the difficulty in evaluating the effectiveness of charter schools is the wide variety in the types of schools. Some charter schools are entirely online, while others have year-round
and/or extended hours. Some charter schools focus on narrow pedagogical methods while others follow a more traditional curriculum. For instance, there are charter schools such as the Utah Winter Sports Academy that place heavy emphasis on high-level international athletic competition. Established charters in Utah also include a purely discovery learning school where students are at liberty to choose what and when they learn, a charter school that places highest priority on writing and requires all subjects to be taught in a way that emphasizes writing, military-school charters, a charter school designed specifically for autistic children, and three totally virtual charter schools (Utah Association of Public Charter Schools [UAPCS], 2015).

Instead of trying to determine a definitive yes or no on the question of whether these charters have helped solve the education crisis, perhaps the better question is to review some of the different teaching and learning methods implemented at charter schools and determine which of those methods result in improvements to student learning outcomes. These methods could then be described as best practices with evidence to support broader adoption at other schools. This review of the literature will focus on describing the kinds of teaching and learning strategies adopted by charter schools and the evidence of their effectiveness.

**Background**

**What Is a Charter School?**

Charter schools are publicly funded K-12 schools chartered or authorized by a local school district, a state school board, or other municipal entity. Charter schools are in operation in 44 states and the District of Columbia (NAPCS, 2019). Charter schools generally receive autonomy from the local rules and procedures that govern traditional public schools. Charter schools can be proposed and managed by groups of parents, educators, professional charter school companies, or any other interested group (Finn et al., 2001). In exchange for the
authorization to operate and the extra autonomy, the charter school agrees to be accountable for student outcomes. If outcomes are not sufficient, the authorizing agent may revoke the charter. Beyond equitable access and mandated testing, charter schools are generally free to experiment with any other aspect of the school—from organizational structure and pedagogical methods to teacher hiring, training, and retention procedures (Chenoweth, 2007; Han & Keefe, 2020; Nathan 1997).

Charter Schools at the National Level

The charter school concept is a relatively new development in the history of American public school education, with the oldest charter schools only being in operation for about 27 years (Urahn & Stewart, 1994). At both national and local levels, there has been considerable excitement that charter schools may have the potential to drastically change and improve public education as we know it (Nathan, 1997). Charter schools can and have received a significant amount of federal grant money (Miron & Urshel, 2010). The No Child Left Behind Act included provisions to help fund charter school start-up costs and facilities (NCLB, 2002). Politicians on both sides of the political aisle, including Presidents Bush, Obama, and Trump, have supported charter schools (Khatami, 2019; Riley, 2014; Smith et al., 2011). Conversely, other politicians, including some from both major parties, parents, teachers’ unions, and taxpayers, have voiced strong concerns and opposition to charter schools (Maxwell, 2012; Raymond, 2014).

Opponents argue that charter schools drain public funds from traditional schools while not demonstrating significant improvements in student learning outcomes and put students at risk for the sake of experimenting with a market demand approach to education (Lake, 2006; Maxwell, 2012; Pope, 2019). There have also been concerns with using school children to experiment with new methods, concerns of hidden preferential treatment among who gets to
enroll and stay enrolled, and concerns about teacher quality given that in many states charter schools are not required to hire state licensed teachers (Buddin & Zimmer, 2005; Han & Keefe, 2020; Murphy & Shiffman, 2002; Wells et al., 1999). Others contend that charter schools have matured to the point that there is evidence to support they are better than traditional schools (Cremata et al., 2013) and recent attacks on charter schools are not warranted (Baude et al., 2020; Hannaford, 2014; Raymond, 2014; Smith 2014).

**What Research Has Been Done?**

With the attention and resources that have been given to charter schools come many questions as to whether the public money funding charter schools is being well spent. Charter school research points to issues of consistency and variability in the quality of charter schools (Baude et al., 2020; Betts & Tang, 2011; 2018; Lubienski & Weitzel, 2010; Nelson, 2008). For instance, students at the BASIS School in Arizona outperformed all of their international peers in literacy and math and 100% of BASIS students tested college-ready (Kronholz, 2014; Levosky et al., 2017). Yet, there are reports of other charter schools where students perform at a statistically significant lower level than the students attending regular schools in the same district (Henry, 2017). A 2012 study by two University of Utah researchers documented some Utah charter schools outperforming competing district schools and other charter schools showing drastically lower results than district peers (Ni & Rorrer, 2012).

The volatility of the charter school issue has both proponents and opponents each pointing to studies that support their point of view. For instance, in response to the BASIS school testing results, opponents claim the results are biased by the type of student attracted to attend the school, saying only high achievers attend and comparing results to a traditional school is not fair (Kronholz, 2014; Levosky et al., 2017). Previous research has run the gamut from studies on
who is likely to attend a charter school (Hoxby & Murarka, 2009), the impact of school choice
on charters and traditional schools (Hanushek et al., 2007), types of charter school management
(Loveless & Jasin, 1998; Zimmer et al., 2019), how charter school laws and authorizers vary
from state to state (Bulkley, 1999; Evan et al., 2020), comparison studies of student test scores
(Chingos & West, 2015; Nelson, 2008), to charter school financial accountability (Ford & Ihrke,
2020; Lake, 2006; Manno et al., 2000).

Since the first charter school only opened in 1992, research in the area could still be
considered in its infancy. This is not to say there are not a lot of charter school studies, because
there are, but that we have yet to see a depth and breadth of charter school research that matches
traditional educational research. There does not seem to be a standard way of defining exactly
what makes a successful charter school or any clearly defined metrics that would give legitimacy
to comparing one school to another. Further, there does not seem to be a standard way of
identifying which innovative practices actually produce improved student learning outcomes. In
four recent literature reviews on charter school studies (Betts & Tang, 2011; Blazer, 2010; Smith
et al., 2011; Zimmer et al., 2019), all four noted the difficulty in measuring charter school
success because of issues in how to define the study population in a way that accurately
measures results from charter versus traditional students. They also described problems in how to
define success and whether it should be based on student test scores, readiness for college,
parental satisfaction, or something entirely new. The authors noted that many studies are
compilations of success story anecdotes rather than empirical research studies documenting
measurable data. However, instead of doing comparisons between charter and traditional
schools, a more effective solution might be to look at best practices in charter schools. Analyzing
the specific methods documented in the research for ways they can be implemented at other
schools and noting the effect those methods have on learning outcomes seems to be a useful approach.

In this review of the literature, we will not attempt to use research results to draw comparisons between charter and traditional public schools. Instead, we will review research that describes the kinds of teaching and learning strategies most used by charter schools. We will then review the research for evidence of effective strategies and how those strategies compare to Bloom’s 2 sigma result.

**Methods**

Charter school strategic innovations can come in a variety of forms—from experiments with the type of organizational structure, to alternative methods of teaching, to new uses of technology. In 2011, Smith et al. proposed a conceptual framework for grouping different types of strategic practices found at charter schools. They describe these practices as being at either the classroom, school, or system level (Smith et al., 2011) with subcategories in each of these groups.

Smith et al. (2011) describes a classroom-level innovation as being those that define what type of student or teacher might appear in the classroom of a particular charter school. Some charter schools, for instance, are targeted towards a particular population of children. This includes charter schools geared towards helping a specific minority population, those with learning disabilities, or those with unique circumstances such as children traveling because of involvement in high-level athletic competitions.

Although learning takes place at the classroom level, Smith et al. (2011) described curricular practices as school-level strategies because a school’s curricular focus is generally implemented at a school-wide level. A school focusing on fine arts, for instance, could be
described as having a school-level curriculum innovation. Other school-level innovations could come in the areas of finance, governance, or facilities.

This analysis of the literature will concentrate on research studies that describe and report results of school-level teaching and learning practices found at charter schools, because it is those types of solutions that most closely align to Bloom’s (1984) call for action in solving the 2 sigma problem. These are the kinds of solutions where outcomes can be measured in terms of effect-size and interpreted in the context of Bloom. We will exclude research literature that focuses on classroom or system-level practices, or school-level innovations unrelated to teaching and learning. There are many other types of strategic practices that appear frequently in the literature, particularly issues of school-choice and parental involvement; however, this review will be targeted to a review of teaching and learning practices, including the most frequently cited teaching and learning strategies found at charter schools and their effectiveness because such strategies might best be poised to solve the 2 sigma problem. This review of the literature is guided by the following research questions:

1. What are the most commonly discussed teaching and learning practices to appear in charter school literature?
2. What evidence does the research support for the quality of these practices and that they actually work?
3. For these teaching and learning practices, what effect sizes are reported?
4. How generalizable could these practices be for other schools?

Data Collection

Data collection first involved searching the literature for research studies on the various types of teaching and learning practices found at charter schools. Only peer-reviewed research
articles from 2000 to Spring 2020 were considered, not only to ensure that articles were recent and timely, but because charter school research has only recently progressed, as described by Smith et al. (2011), to the point that there are a variety of quantitative and qualitative research studies, as opposed to the anecdotal reports that characterized early research.

Initial searches were conducted in Google Scholar to find and refine search terms and related secondary search terms. This process yielded search terms of “charter school” with a secondary search term within each search. Secondary search terms were innovation, teaching methods, pedagogy, teaching and learning, best practices, reform, curriculum, achievement tests, technology, and outcomes. Research studies were then identified from three databases: JStore, EBSCO, and ProQuest. These databases were chosen because an initial search of the terms charter school innovations produced, by far, the most hits in these databases. These databases were searched with a main search term, charter school, as well as a secondary search term for each search.

Initially, the databases were searched with the setting that the search term could be found in any location of the document. However, this type of search quickly proved to be too unfocused with thousands of results, most of which were actually unrelated to charter schools—the search terms just happened to be mentioned in the article, usually as an aside, rather than actually an article about charter schools. Conversely, searches conducted with the search terms limited to the article titles proved to be too restrictive. As a result, the search was conducted in article abstracts, the logic being that if the term was in the abstract, it was likely an important part of the article. The database search settings were further constrained to include only peer-reviewed, English-language articles appearing in scholarly journals, conference proceedings, or foundation reports from the year 2000. The initial search of the two databases yielded 792 hits.
Titles and abstracts were then reviewed to determine if the article was primarily about charter schools and school-level teaching and learning practices. Other types of articles, such as those describing classroom or system level innovations, or school-level innovations about other topics, were excluded from consideration. Only studies that included a report on student-learning outcomes were considered, although articles could report on outcomes that were either positive or negative. Further, only articles specifically about charter schools in the United States were considered. Studies came from either peer-reviewed journals, conference proceedings, book chapters, or research reports from foundations. Blogs, political papers, mainstream news articles, and anecdotal reports were excluded as part of the data analysis but, in some cases, are included as separate citations for the background section of this review. Of the initial 792 articles, 105 were determined to meet inclusion criteria based on a review of the article titles and abstracts.

Data Analysis

We first performed a cursory review of each article’s title and abstract to determine if it was, in fact, an article about charter schools in the United States. In some cases, articles about political charters, medical school charters, and other entities unrelated to public charter schools appeared in the search results. These articles were deleted from our results list. We then categorized articles as either being about teaching and learning practices or not. There were reports on interesting charter school research in other areas, such as school governance practices, charter authorizing agency procedures, and school choice, but because they were not about teaching and learning practices these were also deleted from the results list.

For the remaining 105 articles, titles, abstracts, and keywords were used to group similar articles together into 15 general types of teaching and learning practices (see Table 1). These defined groupings were also influenced by a table from the chapter, Charter School Innovation
in Theory and Practice by Lubienski and Weitzel (2010). Their list is a more detailed and at a more expanded level than the 15 general groups we created for coding the teaching and learning practices described in this review, however his list provided an encompassing view of the many different types of specific teaching and learning practices found at charter schools and was considered as we defined the 15 categories.

The list of categories evolved during the coding process because some categories proved to be too narrow while others were too broad. The biggest question was whether to separate each of the specific teaching and learning focuses into their own groups or put them together as one category. Many studies were qualitative narratives about the unique curricular focuses of particular schools. There were articles, for instance, that reported on schools using KIPP (Knowledge is Power Program), STEM (science, technology, engineering, and math) programs, and theatrical arts training methods (Angrist et al., 2010; Farbman et al., 2013). The question was whether KIPP, STEM, and other methods should each be a separate group or if they brought together some common level of curricular strategy that should be one group. In the end, we decided to put articles about these types of schools together under a category called specific curricular immersion because they had the common theme of being a school whose vision centered on immersing the student with a specific curricular type. Likewise, research involving technology was grouped together into two general categories rather than having numerous small groups about different applications of technology. The two technology groups were (a) articles about virtual schools and (b) all other technology programs at brick-and-mortar schools, such as those that had laptop or tablet programs or other technology-driven instruction.

Schools that based their instruction around a particular theme were grouped under the thematic curriculum category. These schools did not divide subjects into traditional classes like
math, language, or social studies. Instead, they integrated instruction on multiple topics together around themes such as environmental awareness, social justice, or historical events. The culture-oriented curriculum category grouped together schools that used their curriculum to teach awareness of a particular culture or unite students together by teaching to a specific culture or belief system.

The other groups were more straightforward in terms of what should or should not be included in the group. The extended-hours group, for instance, simply included any article about schools that required more hours of curricular instruction than the minimum hours required by law. Because the articles could cover more than one curricular perspective each article could be coded into multiple categories. For example, several of the articles about extended learning hour programs also described curricular programs in other categories such as a specific curriculum immersion program. In several cases with the extended hours schools, the extra hours were used to have time for STEM programs or to add extra arts programs.

After the articles were coded into one or more of the 15 groups, we then performed a simple count on which practices appeared most frequently. The frequency count provided the basis for a review of the top three most studied practices. Table 1 is a list of the 15 curricular groups described in the different studies along with a frequency count.
Table 1

*Final Coding Counts*

<table>
<thead>
<tr>
<th>Curricular Practice</th>
<th>Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology-based/Virtual</td>
<td>41</td>
</tr>
<tr>
<td>Specific Curricular Immersion (e.g., KIPP, arts)</td>
<td>39</td>
</tr>
<tr>
<td>Extended Learning Time</td>
<td>25</td>
</tr>
<tr>
<td>Technology Programs (brick &amp; mortar)</td>
<td>18</td>
</tr>
<tr>
<td>Self-paced/Child-centered</td>
<td>11</td>
</tr>
<tr>
<td>Thematically Integrated Curriculum</td>
<td>9</td>
</tr>
<tr>
<td>Culture-oriented Curriculum</td>
<td>9</td>
</tr>
<tr>
<td>Experiential Learning</td>
<td>8</td>
</tr>
<tr>
<td>Project-based Learning</td>
<td>7</td>
</tr>
<tr>
<td>Active Learning</td>
<td>7</td>
</tr>
<tr>
<td>Character/Citizenship focus</td>
<td>7</td>
</tr>
<tr>
<td>Service Learning</td>
<td>5</td>
</tr>
<tr>
<td>Non-graded Classes</td>
<td>4</td>
</tr>
<tr>
<td>No Homework</td>
<td>4</td>
</tr>
<tr>
<td>Portfolio Requirements</td>
<td>4</td>
</tr>
</tbody>
</table>

After coding the articles, we determined the top three studied practices were technology-based virtual schools, a specific curricular immersion, and extended hours. There were a total of 105 articles coded into one or more of these three groups. Following the coding, each of these
105 articles was read in full and adjustments were made to coding if necessary. These articles are cited by category.

Because articles could show a positive, negative, or neutral effect on learning outcomes, we reviewed and reported on findings for each group separately to get an idea of the totality of research and general indication of success or failure of a given type of practice.

Results

The results are organized by the three top studied school-level teaching and learning practices. We will first review the research that describes technology-based instruction at virtual schools and describe the common strengths, weaknesses and impact these school-wide innovations have had on student learning outcomes. We will then follow the technology review with a discussion on the results for articles describing a specific curricular immersion and then review the research on extended learning hour programs.

Technology-Based Instruction

Many scholars, education practitioners, and technology leaders have assumed the solution to the 2 sigma problem lies in educational technology. Bloom (1984) himself mused that technology may be the answer because of the ability to scale technology-based learning programs in a cost-efficient manner. Thirty-five years later, entire university programs and degrees are now devoted to educational technology. Advances in hardware, software, and internet-delivered services have led to a spectrum of technology adoption in public education. At one end of the spectrum are schools that are entirely virtual with most curriculum and student interactions delivered online. At the other end of the spectrum are traditional brick-and-mortar schools adopting new programs that use technology in some fashion, such as one-to-one iPad programs or computer labs for supplemental instruction. Somewhere along this spectrum are a
The growing number of blended learning programs—the combination of in-person and computer-mediated instruction (Graham, 2006) and flipped classrooms—a methodology of expecting students to watch or read the curriculum online before class time and then using class time to for active learning and activities (Abeysekera & Dawson, 2015). Charters have and continue to experiment with various models at all points along this spectrum (Ahn, 2011; Oliveira et al., 2019). Thus, not surprisingly, research articles involving technology at charter schools were the most numerous type of study in this review.

A total of 59 articles were primarily technology-focused and described different technology uses to deliver or facilitate the curriculum. Because a natural division of these articles fell along the lines of the technology programs at online schools as opposed to technology uses in traditional brick-and-mortar schools, the overall technology category was separated into those two groups. Of the technology-focused articles, 41 were about charter schools that were entirely online virtual schools, while the other 18 were about different technology programs in traditional brick-and-mortar charter schools. As a result, technology in virtual schools became the top result in this review.

Schools that deliver most learning experiences and curriculum online are referred to in the literature as cyber, online, e-, or virtual schools. For purposes of this discussion, we will refer to them as virtual schools. Just as charter schools themselves are relatively new educational structures, the oldest virtual schools are even newer, with the oldest not even 20 years old (Greenway & Vanourek, 2006). Their numbers have grown rapidly in the last decade as virtual school models have become popular offerings by both charters and traditional school districts (Miron et al., 2018). In 2003, there were only 60 virtual schools in 13 states (both traditional and charter); however, by 2010 that number had grown to over 195 schools in 26 states serving
105,000 students (Brady et al., 2010). By the 2017-18 school year, the National Education Policy Center estimated 297,712 students were enrolled in 528 full-time virtual schools across 34 states (Molnar et al., 2019).

Some argue that virtual schools are the obvious next step in the evolution of education because, proponents contend, they can deliver school better, faster, and cheaper than their traditional counterparts that are bogged down in expensive physical facilities, deep administrative layers, and tenured teachers (Barbour et al., 2018; Huerta, 2006a; Huerta 2006b). Some proponents contend that virtual schools are the disruptor of traditional education and will eventually supplant it (Christensen et al., 2010) – an opinion shared by *U.S. News and World Report* owner Mortimer Zuckerman who claims virtual schools “are on the threshold of the most radical change in American education in over a century” (Greenway & Vanourek, 2006, p. 36).

Supporters of virtual charter schools argue that the model changes, for the better, a fundamental component of the education equation—moving from time being static and learning being variable, to time being variable and learning being static (Ahn, 2016; Greenway & Vanourek, 2006). That is, with a virtual school, a student usually gets to set their own pace through the curriculum, taking as much or as little time as needed to complete a set learning objective (Clark, 2001; Gulosino & Miron, 2017). Proponents also argue that the money saved from not having physical facilities can be spent on more customized learner interactions (Barbour, 2009; Barbour et al., 2018), that online curriculum is easier and faster to update (Bernard et al., 2004), that computerized instruction can lead to more robust learning analytics and adaptations to the curriculum based on data (Wiley, 2009), and that curriculum can be more easily adapted to the needs and talents of the learner (Barbour, 2009; Rickabaugh, Sprader, & Murray, 2017).
The research also indicates that a primary benefit and purpose of virtual schools is their ability to increase access to education (Barbour & Reeves, 2009; Greenway & Vanourek, 2006; Rose & Blomeyer, 2007; Wiley, 2009). Greenway and Vanourek commented that, “the internet is beginning to liberate education from the confines of traditional time and space” (2006, pg. 35). The ability for students to login from any location at any time of their choosing allows learning to take place at home or thousands of miles away from a teacher, as described by Dillon and Tucker that “virtual learning allows these choices to be unbound by geographic constraints” (2011, p. 53).

Virtual schools may also be seen by parents as a better option for students with challenging schedules because of work, travel, parental military duties, illness, or for whom the social aspects of school are interfering with academics (Barbour et al., 2018; Marsh & Carr-Chellman, 2009). Virtual schools also require increased parental involvement and student discipline to stay on schedule (Dillon & Tucker, 2011; Rice, 2006). Ahn describes virtual schools as “an extreme substitute to the normal public schools experience (2011, p. 21).

A frequently cited problem for virtual schools is student engagement as demonstrated in low course completion rates (Stuiber et al., 2010; Thomas, 2002; Tucker, 2007; Waters et al., 2014). In her 2014 meta-analysis, Waters reported on studies that documented higher than average drop-out rates at charter virtual high schools with some approaching drop-out rates of 34% compared to typical geographically nearby schools with rates in the 4 to 8% range. Fitzpatrick noted that students transferring to a virtual school significantly dropped in math and literacy proficiency compared to public school peers (Fitzpatrick et al., 2020).

The nature of virtual schooling removes much of the social interactions and the pressure intrinsic with having to attend class and be accountable to a teacher. Since students are, generally
speaking, working on their own, how well they can stay focused and disciplined to stay on track is critical to course success (Barbour et al., 2018). Virtual schools have experimented with a variety of models to increase engagement and completion rates by implementing options ranging from social media to replicate the social aspect of school, to having teachers make frequent contact with students, to including synchronous and asynchronous options, and to setting expected coursework milestones (Betts & Hill, 2006; Lehman et al., 2001; Lueken et al., 2015; Zimmer et al., 2009).

As virtual schools have evolved, they have increasingly applied new innovations in curriculum design to offer dynamic learner adaptive experiences (Barbour & Reeves, 2009; Lueken et al., 2015). In these environments, student mastery can be measured adaptively and appropriate content delivered to provide remediation (Thomas, 2002). Technology advances have also allowed for higher fidelity graphics, more complicated simulations, and even virtual worlds (Ahn, 2011; Ahn & McEachin, 2017; Barbour et al., 2018). Despite these advances, many studies point to a continuing problem of consistency in the quality of online instruction (Barbour & Reeves, 2009; Dillon & Tucker, 2011; Fitzpatrick et al., 2020).

Virtual schools are also navigating the issues surrounding the use of social media while increasingly using social media as part of the learning process. Where extreme isolation could once be an insurmountable barrier to a successful experience, social media connections between students and teachers and students and students has helped replicate the kinds of interpersonal connections found in traditional schools. Some virtual schools require student participation with blogs, Facebook, Twitter, or other websites (Waters et al., 2014). One study noted students reported higher completion rates when engaged with their teacher online than those who did not. Another indicated that completion rates improved when online teachers performed the role of
learning coach and regularly checked in with the student to ask them how they were doing and to set goals (Cavanaugh, 2009). As noted by Barbour and Plough, “The social network has been the public space that has allowed the students a sphere for their social development . . . similar to the kind of public space they would have experienced in the traditional school environment” (2009, p. 58).

Because of the high cost to develop a robust electronic curriculum system, online curriculum development has become a popular arena for for-profit online curriculum companies to partner with charter schools. For instance, the company K12.com partners with charters in 23 states to deliver a virtual school experience (K12.com, n.d.). By absorbing high development costs, these companies have helped accelerate the growth of virtual charter schools (Schaffauser, 2012). Along with this private development have come concerns about private companies profiting on student education and how such enterprises are held accountable for results (Saul, 2011).

Despite their rapid growth, like most new educational developments, virtual schools have experienced their share of disappointments and challenges (Beck et al., 2019; Fitzpatrick et al., 2020; Kowch, 2009; Zimmer et al., 2003). Early virtual schools were often just online duplications of the same curriculum and suffered poor student outcomes (Clark, 2001; Cook, 2002). Dillon and Tucker noted that, “simply putting the same curriculum online is unlikely to result in higher-quality learning” (2011, p. 57). However, in a 2006 meta-analysis of 116 virtual schools, Greenway found no significant differences in student outcomes between virtual schools and brick-and-mortar operations. He noted many comparative studies indicate the distance-learning model can be as effective as the classroom model (Greenway & Vanourek, 2006). The
operative word in his finding is the word *can*. Virtual schools can be as effective as traditional schools with a judicious implementation, but they can also be a failure.

Greenway’s findings suggest that while virtual schools may replicate outcomes of traditional schools, their effect is essentially a zero sigma difference, and thus they do not help or hinder in the context of the 2 sigma problem. With any new innovation, effectiveness typically grows over time, and so continued investments and improvement in virtual learning is likely to show improved outcomes over time (Fitzpatrick et al., 2020). However, some of the research suggests that virtual schools have grown too fast and with too little oversight concerning student outcomes, and that many virtual schools have significantly worse outcomes than other schools (Beck et al., 2019; I. Quillen, 2011). Indeed, 10 years after Greenway and Vanourek (2006) showed no statistically significant difference in the outcomes of virtual school students, a report by the National Education Policy Center reported that, “virtual schools continued to underperform academically, including in comparison to blended schools. Overall, 37.4% of full-time virtual schools received acceptable performance ratings, compared with 72.7% acceptable ratings for blended schools” (Miron et al., 2017, p. 3).

Just as student outcome results vary tremendously among different brick and mortar charter schools, the virtual charter school subgroup has also produced results ranging from subpar to better than average compared to traditional schools. And, just as with judging traditional charters, a number of issues arise when comparing virtual schools to traditional schools. A significant issue in judging the effectiveness of virtual charter schools is the type of student attracted to attend such a school (Cavanaugh, 2009; Shoaf, 2007). Virtual charters tend to serve a unique, niche population of students from both ends of the ability spectrum for whom a traditional in-person program is not a desired option (Ahn, 2011; Ahn & McEachin, 2017;
Hornbeck et al., 2019). Students falling through the cracks, students needing to make up credits, and students from at-risk backgrounds comprise a higher proportion of the virtual student population than a typical school (Ahn, 2011; Torre, 2013). A 2015 study on charter schools in Arizona found that of the five virtual charter schools in the study, they collectively produced a negative effect on test scores of -0.11 to -0.25 standard deviations from traditional schools (Chingos & West, 2015). However, the authors noted that, “like students that attend schools for at-risk students, virtual schools may have unmeasured characteristics that confound these results” (p. 128). For some, a virtual school is a school of last resort and with this reality comes confounded outcome results.

Based on the many confounding variables, particularly with regard to the population of students attracted to virtual schools, it can be concluded that a valid virtual school effect size is not possible to find in the literature. Effect sizes reported range from negative to neutral to positive (Barbour & Reeves, 2009; Beck et al., 2019; Cavanaugh, 2009; Fitzpatrick et al., 2020; Paul & Wolf, 2020; Stuiber et al., 2010; Thomas, 2002; Waters et al., 2014; Woodworth et al., 2015; Zimmer et al., 2003). This finding suggests that the concept of a virtual school itself does not alone cause negative or positive effects, but that differences in implementation and/or student population are a more significant driver.

Despite the challenges of working with a diverse student population, differences in accountability standards, and the high cost of development, excitement continues to keep progress on virtual schools moving forward with new developments in curriculum design and delivery, new ways to mitigate isolation, and new ways to increase completion rates (Barbour et al., 2018; Betts & Tang, 2018; Dillon & Tucker, 2011; Paul & Wolf, 2020; Waters et al., 2014). Although some research documents negative outcomes from virtual schools, nothing in the
literature suggests virtual schools are harmful in and of themselves or to an extent that they should be abandoned. No virtual school can as of yet claim a 2 sigma impact on learning outcomes, but the potential is still there for a virtual school to solve the 2 sigma problem. And most significantly, virtual schools still hold the financial potential to effectively scale a solution once it is found.

**Specific Curricular Immersion**

Many charter schools distinguish themselves by adopting a specific type of curriculum that is applied throughout the whole school. Students are immersed in a particular field of study, focus on a particular subject or goal, or use a particular type of learning methodology. For instance, there are charters that implement intensive *no excuses* academic programs, charters that utilize the Montessori method, charters that apply the Core Knowledge curriculum by Ed Hirsch, charters that focus on STEM instruction or the arts, and charters that implement rigorous college-prep curriculums (Betts & Tang, 2011; Carter, 2000; Frandsen & Lefgren, 2018; Icel, 2018; C. Quillen, 2020). Although not all charter schools are about a curriculum emphasis different from traditional public schools, many are, since, by definition, charters are about innovation and departures from traditional curricular approaches and are an obvious opportunity for experimentation. In fact, one study noted that for founders of charter schools, 58% reported that applying a specific vision for the curriculum was their primary motivation for starting the charter school (Henig, 2005). Thirty-nine articles relating to specific curricular immersion were reviewed for this section.

Part of the excitement with different curriculum is that it represents a new, tangible difference from traditional school. In years past, much educational research focused on changes to class size, per student expenditures, and teacher qualifications and how variations impacted
outcomes (Dobbie & Fryer, 2013). Much of the research pointed to disappointing results that changes in these types of inputs did not correlate with school effectiveness (Dobbie & Fryer, 2013). In contrast, changes in curricular approaches have produced research demonstrating improved student outcomes (Epple et al., 2016; McDonald et al., 2007). Dobbie and Fryer in a 2013 review of charter school research, report that data-driven curricular models, high-dosage tutoring, and high expectation cultures are among the most successful innovations coming out of charter schools.

Differences in the curricular model allow a charter to distinguish itself from competing schools. It’s the high marketing value area for charters since they can advertise exciting or compelling visions for teaching and learning. There are other differences charters can make, such as the type of teacher it recruits or teacher pay practices, but differences in curriculum are the glossy, shiny new car types of changes that can excite parents and the media. The unique curricular programs applied at various charter schools are the focus of many of the popular press articles about charter schools and get the attention from politicians, the media, and parents.

For instance, the Harlem Village Academies, a group of charter schools in New York, emphasizes a progressive pedagogy to education, described on their website as one where students develop a strong ethical sense in an inquiry-based setting of doing and authentic experience instead of practicing with worksheets, drills, and test prep. They have received an in-person visit from former President Obama, been featured in the New York Times, The Washington Post, and Oprah Magazine, and even had Hugh Jackman star in their teacher recruiting video. The school serves mainly low-income, minority students in the Bronx. They have reported solid student learning outcomes, including 100% grade-level proficiency in
literacy for their eighth-grade class, outperforming elite private schools in wealthy New York enclaves (Dobbie & Fryer, 2011).

Although Harlem Village Academies report other school-level innovations, such as different teacher accountability policies, it is their curriculum that receives the attention. Likewise, many of the charter research articles in this review that had titles indicating the article would be about comparing student outcomes between charters and traditional schools, were really case studies about differences in pedagogy, that is the authors found a charter school or group of schools that had an innovative or interesting approach to education, described their programs, and then described student outcomes and/or compared student outcomes to traditional public schools (Abdulkadiroğlu et al., 2011; Epple et al., 2016; Izumi & Yan, 2005; Saw, 2019; Weiss, 2017).

The studies found for this review describe a broad array of curricular approaches. Most were descriptive case studies and comparisons to competing schools. As noted by Berends et al. (2010), “The basic assumption is that if the students performed well, then the charter school is a success” (p. 334). Many of the studies were focused on schools that targeted educationally disadvantaged students and tried to measure the impact the charter school had on closing the achievement gap (Golann & Torres, 2020; Shaffner & Hyland, 2017; Stahl, 2020; Weiss, 2017). Some of the results were impressive. For instance, the SEED network of schools in Washington DC (Success, Engagement, Education, Determination), the only public boarding schools in the country, cater to a population of almost 100% educationally disadvantaged students. Their specific curricular approach is focused on rigorous, college-prep, no excuses, progressive education ideals. Peers at other schools with similar backgrounds go to college at a rate of about 24%, whereas about 90% of SEED students enroll in college after graduation (Curto & Fryer,
The SEED schools utilize an academically rigorous curriculum in a 24-hour learning environment in which every student meets regularly with a college advisor beginning in the 7th grade (seedfoundation.org). Their approach was noted in six of the studies found for this review (Angrist et al., 2010; Angrist et al., 2013; Betts & Tang, 2011; Carter, 2000; Curto & Fryer, 2011; 2014). Curto found that SEED students increased achievement over similar peers, an average of .211 sigma for reading and .229 for math.

The KIPP schools also integrate a college-bound approach into their curriculum. KIPP (Knowledge is Power Program) is a network of 162 charter schools serving primarily economically disadvantaged students (KIPP, n.d.). The program is about making future college-attendance an explicit part of instruction and expectation for all students. They provide field trips to college campuses, college counseling, and a college matching service. KIPP schools also stress student discipline and hard work, emphasizing that there are no excuses and no shortcuts to good grades, college admittance, and a successful life. The schools utilize contracts between parent, school, and student to emphasize accountability (KIPP, n.d.).

The KIPP programs have documented improvements in student outcomes over traditional schools (Frandsen & Lefgren, 2018; Rose et al., 2017). Their alumni graduate from college at a higher rate than their peers (33% versus 8%), and although the 33% who graduate from college is lower than KIPP’s stated goal of 75% graduating from college, this number has gradually risen every year (Frandsen & Lefgren, 2018). As noted in one research report, “In recent years, charter schools such as the Knowledge Is Power Program (KIPP) . . . upended the way Americans think about educating disadvantaged children, eliminating the sense of impossibility and hopelessness and suggesting a set of highly promising methods” (Bendor et al., 2007, p. 14). The KIPP approach is described and contrasted with traditional schools in nine of the articles reviewed.
(Angrist et al., 2010; Angrist et al., 2013; Cheng et al., 2017; Ellison, 2012; Frandsen & Lefgren, 2018; Rose et al., 2017; Ross et al., 2007; Tuttle et al., 2013; Woodworth et al., 2008). Angrist et al. (2013), for instance, found that attending a KIPP school resulted in .35 standard deviation improvement in math learning outcomes over students who had entered a KIPP lottery but did not gain entrance.

A secondary school system in Arizona, San Antonio, and Washington, D.C. called BASIS has also attracted much attention because of their ranking by U.S. News and World Report as the top charter high school in the United States (Kronholz, 2014). In 2013, one hundred percent of the school’s graduating seniors tested college ready in math and literacy (BasisEd, n.d.). In 2019 PISA testing (Programme for International Student Assessment), an international study comparing math, science, and reading among 15-year-olds worldwide, BASIS students outscored all other student groups from 40 participating countries (BasisEd, n.d.). These results placed BASIS students among the top 1% performing students in the world (Kronholz, 2014).

The BASIS curricular approach is rugged academics (BasisEd, n.d.). Students begin learning Latin in the 5th grade, algebra and physics in 6th grade, and must take AP calculus as a graduation requirement (Kronholz, 2014). At the high school level, taking and passing AP tests is a primary goal. Students are also expected to complete all high school coursework by the 11th grade. They can then either graduate early or spend their senior year on an intensive independent project. Although they have seen extraordinary success on standardized test scores, the schools also have an above average turnover rate. Most traditional public schools see attrition rates of about 10%. BASIS schools lose about 40% of their students every year (Carruthers, 2011). This high attrition rate is cited by opponents of charters that certain models have over-inflated results.
because students not doing well self-select out of the school, thereby saving the school from a potentially low test score (May, 2006; Betts & Tang, 2011; Carruthers, 2011; Winters et al., 2017).

A common teaching and learning feature among KIPP, BASIS, and SEED schools is a high-expectation/no excuses culture. The teaching and learning framework in these schools centers on students working on advanced or above-grade level curriculum, staying with the curriculum until mastery is achieved, and an emphasis on math and literacy skills. Several of the research articles cited one or more of these different programs with no excuses as the common thread (Davis & Heller, 2019; Golann & Torres, 2020; Krowka et al., 2017). Student achievement in math and literacy was typically higher for these students than those in traditional schools, but drop-out rates were also higher.

Some charter schools emphasize a comprehensive curriculum that includes intensive training in the arts (Abdulkadiroğlu et al., 2011; Aprile, 2019; C. Quillen, 2020). Educational time devoted to the arts has reduced dramatically in the time since No Child Left Behind. Some charter school founders noted a desire to restore arts education as a motivation for opening a charter school (Henig, 2005). The 2009 American Investment and Recovery Act, ostensibly a bailout bill for banks during the recession, also included funding for a program called Turnaround Arts Initiative with money for struggling schools to adopt an intensive art program. The program included funds for training, supplies, and extra time for the school day. The program has seen positive results. In one case, a struggling school went from being one of the lowest performers in the state of Massachusetts to one of the top 5% (National Center on Time and Learning [NCTL], 2014).
Since one of the stated purposes of charter schools is that innovations proven successful can be adopted by traditional schools, finding charter innovations in traditional schools could be seen as evidence of success. Indeed, some curriculum innovations have found their way to traditional public schools. In a 2008 study by Hoxby and Murarka, they documented that in the early 2000s almost half of all New York charters used Saxon Math as their sole math curriculum, while no traditional public schools did. Saxon Math is a leveled curriculum based on daily introduction of progressively harder math topics followed by review of previous topics (Houghton Mifflin Harcourt, 2020). Students spend math time almost equally between new topics and old topics. Since several research studies have documented the effectiveness of Saxon for standardized math scores, many traditional public schools have adopted the Saxon Math curriculum based on successful results from charter schools (Betts & Hill, 2006; DeCarlo, 2011). Saxon Math is one example of a charter school innovation that has found success in traditional schools.

In his 2014 study of charter school best practices being adopted at 20 traditional schools in Houston, Texas, Fryer documented a .18 positive effect on elementary and high school math scores. Fryer’s research looked at five different innovations, including applying the teaching and learning practices of data-driven instruction and high expectation/no excuses cultures at the 20 traditional schools. Although these practices had a positive effect on math achievement, they had little effect on reading achievement (Fryer, 2014).

Although specific curricular immersion is one of the most obvious ways for a charter to distinguish itself among traditional schools or competing schools, it is also one of the most difficult to generalize. It would be difficult, for instance, to generalize the success of the BASIS schools with all college-prep high schools. It would also be difficult to generalize results that
compare schools with vastly different curricular focuses, e.g., comparing rigorous academics schools with ones that rigorously focus on the arts.

The question again returns to how to compare apples with oranges. Both charter proponents and charter opponents can find studies to back-up their point of view. In a 2005 review of 38 research articles, Hassel found that studies that measured absolute performance generally showed charters had a negative effect whereas those that measured growth had a positive effect. In *The Charter School Dust-up*, Carnoy et al. (2005) reviewed 19 charter school studies and reported that after the studies were controlled for differences in the students, charter schools had a negative effect on student learning. Yet, individual case studies of specific schools have clearly demonstrated positive learning outcomes, such as the .35 sigma difference found for KIPP schools on standardized testing results in math or the internationally top-rated BASIS schools on the PISA test.

One explanation is that charter school performance among all charters tends to skew to extremes. Charters have produced evidence of amazing successes and dismal failures — not a surprising result when viewed through the lens that charters are supposed to be about innovation. Some of those innovations shine, while others fail. Charters are thus more risky but also have the potential for greater reward. One popular press analysis of Arizona charters noted that charter schools are “five times more likely than district schools to perform in the top 2.5% of all schools in the state, yet they are also 12 times more likely than district schools to fall in the bottom 2.5%” based on data released from the Arizona Department of Education (Gelbart, 2013, para. 8).
Extended Learning Time Programs

The average public school student spends 180 days and 1000 hours in school (Silva, 2012). The number of instructional hours required in school is mandated in all but three states. Since charter schools are required to adhere to the same state laws as traditional public schools regarding instructional time requirements, charters must also meet these basic minimums; however, this is also one area where charter schools can clearly differentiate themselves from competing schools by offering additional instructional time.

Researchers note that extended learning time (ELT) programs have a high marketing value for charter schools because they are quantifiable in a way understandable to parents. A school either offers an ELT program or they do not. In his 2012 review of ELT research, David Farbman noted there are about 700 ELT programs at public schools in the U.S. and of those about 75% of them are at charter schools.

The Department of Education defines an ELT program for grant and funding purposes as one that adds 300 instructional hours to the school year (Lazarin, 2008). Twenty-five articles in this review described various extended learning time programs. They documented a variety of ELT models in locations across the country. ELT programs are generally offered in two ways: either days are added to the school year or hours are added to one or more school days. Some unique variations of ELT programs that have been reported in research include the SEED schools which offer a Monday through Friday boarding program, the KIPP charter schools in New York that require Saturday attendance (Farbman, 2012; Patall et al., 2010), and schools that partner with outside entities to provide activity-based after-school programs that complement their academic curriculum (Farbman & Kaplan, 2005; McCombs et al., 2011).
The premise of an ELT program is simple: offering more instructional time leads to better academic results. One study reported by the National Center on Time and Learning (NCTL) provided impressive statistics on benefits of ELT programs. They noted that, on average, only 51% of minority students graduate from high school (NCTL, 2014). At ELT charter schools serving traditionally underserved minority populations, some reach graduation rates as high as 90%. ELT schools report a variety of improved student outcomes including higher test scores, lower dropout rates, and higher college attendance (NCTL, 2014).

Since No Child Left Behind, there has been a shift in the way instructional time is used. From 2002 to 2007, 230 minutes a week of time has been added to math and language instruction (Farbman, 2012). As a result, 243 weekly minutes have been lost in physical education, arts, music, science, and social studies. Some charter schools report using ELT to add back arts and music programs that may have suffered because of NCLB and the emphasis on standardized testing (Farbman, 2012; Farbman, Wolf & Sherlock, 2015; Silva, 2012; NCTL, 2014). Extended learning time has been shown to be an equalizing factor in closing the achievement gap for educationally disadvantaged students (Dobbie & Fryer, 2015; Fryer & Dobbie, 2011; Hoxby & Murarka, 2009; Hoxby, Murarka & Kang, 2009; Krowka et al., 2017; Lauer et al., 2006).

Two studies described how using ELT programs to increase arts education has had a positive impact on student academic achievement (Chenoweth, 2007; Farbman et al., 2015). Another study reported that for every 10% increase in time a 2% increase in actual learning was measured (Silva, 2012). Some schools use the extra time for hands-on learning and activities such as karate club, Harry Potter reading groups, or chess matches (Garcia et al., 2018; Pennington, 2006). Such schools have also noticed a decrease in discipline problems (Dobbie & Fryer, 2011). Extended-hour programs have also shown better results than educational reform
efforts that concentrate on lowering student-teacher ratios (Kaplan, 2011). These research experiments generally followed an experimental model of comparing students at similar schools without extended learning time to the charter school using the extended learning time program.

Some of the research includes critics that argue that, at least in failing schools, other variables must be addressed first. Failing schools won’t succeed merely because a few extra hours or days are added to the attendance requirement they note. A failing curriculum will still be a failing curriculum. Simply adding hours potentially adds additional drudgery to student and teacher lives (Redd, 2012; Stein & Ross, 2011). ELT programs are also expensive, adding, on average, $1,300 per student per year in costs (Farbman, 2012).

Despite this criticism, research shows that ELT programs can clearly have positive impacts on student achievement when implemented correctly and that cost is usually the most significant barrier to entry (Curto & Fryer, 2014; Farbman, 2012; Izumi, 2008; Krowka et al., 2017; Patall et al., 2010). Remarkably, all 25 reviewed studies reported some level of student achievement gains with ELT programs in at least one of the schools they studied. Some articles did include data on schools that were not successful with ELT implementations or references to other studies where ELT programs were unsuccessful. These were used primarily as juxtapositions to what the schools that did have success did differently versus schools without successful programs (Patall et al., 2010; Redd, 2012). The bottom-line is that the implementation is critical. Time by itself is not the critical factor, but how time is used. As noted by Silva (2012), “the ELT movement is more likely to leave a legacy of school and student success if it becomes less about time and more about quality teaching and learning” (p. 139).
Discussion and Conclusions

This review highlighted three areas of innovations in charter schools: virtual schools, specific curricular immersion programs, and extended learning time schools. These three areas represented the school-level research areas most commonly found in charter research literature.

Although much of the research was descriptive analysis of particular examples of these types of programs, many articles included a quasi-experimental design method to draw some sort of conclusion about the efficacy of the program. None of the research could be considered a true experimental design because of the lack of random assignment, that is the researchers did not control which research participants were in the charter school and which were not. The researchers tried to come as close as possible to an experimental design through matching charter school participants to non-charter students, or by comparing charter students to those students who tried to enter the school but did not win a seat in the charter’s lottery. Some research was limited to a single data point, while others had more. Despite these difficulties, researchers claimed some level of validity, as noted by Peyser (2011), “we believe it is possible to make reasonable, albeit imperfect, comparisons between these two samples” (para. 11). Hence, a common understanding of how to set up the experimental design in charter school research is one area where more research is needed.

Another common dilemma for researchers was how best to judge the success of a program (e.g., was it merely test scores or was it parent satisfaction, student drop-out rates) student college readiness rates or a combination of factors. In the end, because of the complexity of this dilemma and difficulty in modeling all variables, most choose improved student test scores as evidence of program success, although high school graduate and college attendance
rates were also used. As such, determining what makes an educational program a success and a common framework for understanding it is an important area for future research.

Most of the research designs involved matching charter school students to non-charter students and evaluating the success of the program based on student-test score comparisons. Several researchers noted the difficulty in accounting for all possible variables in the study and whether the studied educational program was really the cause behind test score differences or whether it was something else. Some programs were also complex to the point that some parts may have accounted for success while others did not. For instance, most KIPP schools require extended learning hours and use a rigorous college-prep curriculum. Researchers did not have an experimental design that could determine whether it was ELT or the curriculum causing the higher student outcomes or a combination of both. These designs involve matching charter students on variables such as gender, race, socioeconomic status, parent job status, cognitive ability, and disability. Most articles included a discussion on this research design and the difficulty in how to make comparisons. For instance, in an article about a college-prep charter school in an urban environment, the researchers highlighted the school’s high college attendance rate, but had difficulty definitively drawing a conclusion that the college prep charter school alone caused that rate. They speculated that students who were having difficulty with the college-prep coursework were self-selecting out of the program, leaving the school with an overall higher percentage of high-caliber students than a traditional school.

Just as the difficulty of establishing a reliable research design was the top concern noted in the articles, there were common areas of positive conclusions. Each of these three areas of innovation had a common component that led to successful outcomes: execution. At their face value, the innovation alone could not account for positive learning outcomes. A strong factor in
determining the level of success was how well the school implemented the program with respect to planning, training, implementation, and follow-up. In some cases, the same interventions described by different studies had very different results. The factors that lead to poor execution included underfunded programs, lack of staff training, and lack of a shared vision for the program.

A strong execution was also strongly tied to how long a particular charter school had been in operation. Not surprisingly, the longer a school had been open, the better they were at planning, directing, implementing, and evaluating new programs at their schools, and consequently student outcome scores were higher. In most cases, these programs were evaluated against student test scores, although some studies also included interviews from students, parents, and staff. Consequently, an area of concern that should be a top priority for charter school authorizers is how training funds can best be utilized with charter school staff. Further, additional research on successful execution strategies would benefit the charter community.

The execution and implementation findings were most pronounced in the technology-based programs. Technology for the sake of technology rarely led to success. A critical component for technology schools was training for staff and technology literacy programs for students (Barbour et al., 2018). Another critical component is the continued need for human interaction. Educational content delivered to the student online without any teacher/student interaction proved to be of limited success in most cases (Barbour, 2009).

Many early virtual school programs had difficulty figuring out how to add some level of social interaction into the model. Many schools are now experimenting with social media to replicate the social atmosphere of school. When used appropriately outcomes at technology-based virtual schools could be just as high or higher than traditional schools. Virtual schools
were also more expensive to develop than a traditional school but proceeded with the expectation that per-student costs would be lower once initial development was finished. Although some tout virtual schools as an option for cash-strapped budgets, in the end, virtual schools simply shift how money is used, not take-away the general monetary investment. A primary lesson from the research is that money is still required and that virtual schools are not the panacea for providing free education to all. Virtual schools were also one of the more difficult programs to judge because of the type of student that chooses to attend the school.

Of the three studied areas, the least controversial in terms of it being generally accepted as a positive program was extended learning time. Most researchers concluded that ELT programs work and that money is the reason they have not been widely adopted. Common sense indicates that more seat time for students would lead to better outcomes. However, the sheer expense of adding hours to the school day or days to the school year can be cost prohibitive. The benefit to increased time is such that many schools would be well served to consider re-prioritizing funds to figure out ways to increase learning time. Although much political time and energy has been spent on reducing class size, ELT programs have been shown to be more effective at roughly the same cost.

In summary, this review highlights the need for additional research in the areas of defining what makes a successful school or educational program, how to design experimental studies for evaluating these programs, how to account for a complex array of variables, how to support and train schools to implement programs, how to use technology, and how to find funding for widespread extended learning hour programs, and how to share successful charter school innovations.
Charters are fundamentally about innovation and with innovation comes the possibility of failure. The autonomy granted to charter schools provides an incubation area for testing bold new ideas. The critical piece is for successful innovations to be shared and unsuccessful ones to quickly change course. How best to disseminate successful innovations is a key area for future research.

The variability in the research leads to the conclusion that charters operate in a world of extremes, of high-risk and high-reward. There are wildly successful schools that have devoted student and parent followings with documented positive learning outcomes approaching the realm of Bloom’s 2 sigma result (1984). At the opposite end there are spectacular school failures with students performing well-below state averages. The research suggests that charter school results are not generalizable in a traditional school versus charter sort of way, but that individual, strong, unique well-executed models can serve as examples for traditional and charter schools alike.
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ARTICLE 2

Innovating at Charter Schools: A Design Case Study

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Abstract

In this design case study, we review two of the main design decisions made by our group of instructional designers in the development of a K-6 charter school in Vineyard, Utah, and the outcomes of those choices. Our founding group sought to develop an entirely new educational model, using principles learned in the classroom, as we put together the founding charter for our school. We focus on the design decisions involved in formulating the student learning model, which included a high school-like rotation of classes at an elementary school level, and the differentiated teacher model design, where the functions of the teacher are separated into three distinct job roles based on economy of scale principles. We consider the influence of Dr. Benjamin Bloom’s 2 sigma problem—the educational observation that one-on-one tutoring, though often cost prohibitively expensive, produces outcomes two standard deviations higher than traditional group direct instruction. We study why we made the choices we did, how they were implemented, what went right, and what went wrong.

Keywords: charter school, nontraditional education, design case
Introduction

During the fall of 2013, our group of five graduate students in instructional design at a private university in Utah, along with two educator friends, met to discuss the possibility of writing and submitting a charter school application to the state of Utah. Our group of seven spoke idealistically of creating their “dream school” that would be based on the latest in learning sciences research and educational technology advances. During our university studies, we encountered a variety of research studies that documented the effectiveness of different educational approaches and cutting-edge educational technologies. Some of these studies were cautionary tales about failed initiatives, while others seemed to hold promise as potentially keys to transforming education.

Most of us in the founding group had encountered different research that impacted our view of what a dream school might look like. For one founder, PhD student Jennifer Price2 (first author on this paper), one article in particular had a profound impact on her view of how schools should be conceptualized. Instead of a one-size-fits-all model where some students failed, some succeed, and many got lost in a middle level of mediocrity, I was struck by the notion that almost all students, when given the right learning conditions, can perform at exceptionally high levels as documented in Benjamin Bloom’s classic 1984 educational paper, “The 2 Sigma Problem: Searching for Methods of Group Instruction as Effective as One-on-One Tutoring.”

As a founding group, we became convinced of a disconnect between research and practice, that the latest in educational research was not getting into schools because of the slow-moving pace of educational bureaucracy. Some of our group had taught in local schools and

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2 With first person singular, I am referring specifically to myself, Jennifer Price, first author on this paper. When using first person plural, I am referring to the group of charter founders, not the additional authors on this paper.
lamented how administrative expectations usually meant they were focused entirely on the middle, the average of the class, and that anyone below or above that middle got left behind. Don³, a PhD student nearing the end of his dissertation and member of our founding group, spoke about getting left behind in elementary school because he was too far ahead of classmates. He got bored, left out, and ignored. While at one time he tested three grade levels ahead in math, by middle school he was testing behind grade level because he never felt that the classroom instruction applied to him. Above all else, the group wanted to make sure the design matched what could be backed-up by the research.

For many founding groups, the chartering process is about taking some aspect of traditional education and tweaking it to match the governing board’s philosophy on that one point. Other aspects of the school typically match traditional district public schools. For instance, the primary interest of Utah-based John Hancock charter school’s founders was a small school in terms of overall student population (K. Frank, personal communication, February 23, 2017). They wanted an elementary school with a total of no more than 200 students. Apart from the small school footprint, most other aspects of the school are similar to traditional district schools with a licensed teacher assigned to age-based elementary classrooms, a principal, and standard curriculum. In contrast, this founding group chose to approach their potential new school as a “blank slate” with every detail up for debate. The group decided that everything from the teaching model, to how lunch was served, to how and when students came to school, to how and if homework would be assigned, to the design of the building would be up for discussion.

³ Don is a pseudonym.
A critical moment in the creation story of this charter school that would eventually become Franklin Discovery Academy came when I attended a graduate seminar on Bloom’s 2 sigma problem. Figure 1 in Bloom’s paper, also included in this paper as Figure 1, showing the overlap in similar achievement levels between the top students in a traditional direct instruction class and the lowest performing students in the tutoring group (Bloom, 1984), was something of an eye-opening moment for me. This research demonstrated that even the lowest performing tutored students achieved the same level of mastery as the top performing students in a direct instruction setting.

**Figure 1**

*Bloom’s 2 Sigma Figure Adapted From the Original*

![Figure 1](image)

*Note.* The overlapping area highlighted above shows that the lowest performing tutored students performed similarly to the highest performing conventional students.

During the foundational meetings that were the genesis of Franklin Discovery Academy, we discussed Bloom’s research at length. The idea of mastery learning rang true as a way of meeting students at their level, keeping them engaged with their education, and helping them progress. Bloom described mastery learning as an educational method in which there is a regular
feedback loop of instruction in a traditional group classroom setting, assessment, re-instruction for those that need it and enrichment for those who do not (Bloom, 1984). We were also keenly interested in the one-on-one tutoring as described by Bloom (1984) that when used in conjunction with mastery learning, it would provide a highly personalized education for our students. But, we were well aware that the “problem” in Bloom’s 2 sigma problem was financing. One-on-one tutoring is expensive and generally out of reach on a significant scale for public schools.

We used the blank slate before us to decide how we could create the school in a way to make regular one-on-one tutoring a reality in a public school setting, in addition to using mastery learning in group settings. The one-on-one tutoring and mastery learning question became our primary design focus. Were there places we could save money on the average cost per educational hour to offset the higher than normal cost of tutoring? We worked to put together a charter from the perspective of attempting to solve Bloom’s 2 sigma problem, hoping that it would result in a unique and transformative school.

We wanted to see how much one-on-one or small group tutoring could be obtained with current funding levels by revamping other aspects of the school financial model. Bloom (1984) had mused that funding one-on-one tutoring would be too expensive to “solve” the problem and called on the educational research community to come up with other solutions. We wanted to keep the one-on-one tutoring and “solve” the problem of how to pay for it. We accepted the reality that we would only have regular public school funding, but had control over other aspects of the charter to put it all together in a way that would result in as much one-on-one and small group tutoring as possible. Founding discussions revolved around how we could design the student’s day to where some hours were less expensive and saved the school money, but still
educationally effective and preferably using a mastery-learning model, with the savings then being available for one-on-one tutoring. We spent significant hours on design decisions that would allow us to offer both mastery-based learning and one-on-one tutoring.

In this design case, we review two key design decisions we made during the charter development process and the nuances of their actual implementation. Some aspects of the design on paper translated well to actual operation, while other choices required adjustments to avoid undesirable consequences arising during the translation from theory to practice.

**Context**

We review two areas of the literature to provide a contextual background to our work. First, we review Bloom’s 2 sigma article (1984) and its place in educational research, and second, we review the types of innovations typically found in charter schools and areas of school operations open to innovations.

**The 2 Sigma Problem**

Bloom’s 1984 paper, “The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring,” provided the spark for a variety of mastery-based and personalized learning initiatives across the educational spectrum and provided a foundational principle influencing the design of the school. His research demonstrated that even the lowest performing tutored students could outperform most students in a group direct instruction setting.

Bloom (1984) described the 2 sigma problem as one of finances, that society as a whole simply could not afford to bear the cost of tutoring even though it was clearly a superior, if not the superior, learning condition. Bloom’s stated purpose was to see if any practical and financially viable methods of group instruction could approach a similar 2 sigma result (1984). After charting the effect of different learning conditions and combinations, Bloom (1984) mused
that current research was unable to document a method of group instruction that “solved” the 2 sigma problem, and now it holds a place as one of the most long-standing educational puzzles. In effect, his paper was a call to action that asked, “Can researchers and teachers devise teaching-learning conditions that will enable the majority of students under group instruction to attain levels of achievement that can at present be achieved only under good tutoring conditions?” (Bloom, 1984, p. 4).

The paper was considered groundbreaking at the time of its publication, having been cited in over 700 research articles by 1999 (Google scholar search). Now almost 37 years later, interest in his paper remains high, with some 3,580 citations in research articles in the last 10 years (Google scholar search results, October 2020). However, Bloom’s 2 sigma problem is not merely discussed in academia, but has made the leap to the popular press with many more thousands of references in blogs and educational technology circles as the justification for mastery learning and/or one-to-one tutoring programs. Bloom has been quoted by TedX speakers, politicians, and even philanthropists like Mark Zuckerberg as the basis for funding personalized learning technologies (Zuckerberg, 2017). The paper now occupies a permanent place in educational research as a gold-standard of learning conditions: a one-to-one tutored environment using mastery-learning techniques.

Today, Bloom’s 2 sigma problem has become almost synonymous with “personalized learning,” a term that was not in common use in 1984 (11 hits in Google Scholar in 1984 compared to 49,200 in 2021). The assumption is that the key component of what makes one-to-one tutoring successful is the tutor’s ability to customize, or personalize, the instruction to the ability level of the student. Although some have tried to solve the problem with artificial tutoring systems, Bloom (1984) left open the possibility for the solution to come in any form. Educational
researchers from all corners of the globe have attempted to solve the problem from a wide-
variety of perspectives–from adaptive curriculum to MOOCs (massive open online courses) to
gamification to personalized learning.

**Charter Schools and Innovation**

Charter schools, now operating in 42 states and the District of Columbia (National
Alliance of Public Charter Schools [NAPCS], 2019) are publicly funded K-12 schools
“chartered” or authorized by a local school district, a state school board, or other municipal
entity. Like traditional district schools, charter schools are open to all students and cannot
discriminate against any applicant. Unlike traditional public schools, charter schools are free to
be innovative in the way that they teach, govern, employ, and conduct school operations. Charter
schools can be proposed and managed by groups of parents, educators, professional charter
school companies, or any other interested group (Finn et al., 2001).

Charter schools generally receive autonomy from local school district boards, rules, and
procedures that govern traditional public schools. In exchange for the authorization to operate
and the extra autonomy, the charter school agrees to be accountable for student outcomes. If
outcomes are not sufficient, the authorizing agent may revoke the charter.

Charter schools operate independent of traditional public school districts but receive
public funds based on student enrollment numbers. Proponents of charter schools contend that
freedom from bureaucratic control and an ability to quickly innovate with new teaching
strategies and methodologies makes charter schools best positioned to solve stagnating public
school student performance (Blazer, 2010). Charter schools were cited in the No Child Left
Behind Act as one of the ways to help reform and improve public schools by expanding
flexibility and reducing bureaucracy (No Child Left Behind Act [NCLB], 2002). Despite the
public resources that have gone into funding these thousands of charter schools, results
documenting their effectiveness have been mixed (Baude et al., 2020; Betts, 2011; Cohodes &
Parham, 2021; Spees & Lauen, 2019; Winters, 2017).

A review of charter school research finds that innovative practices can be found at
classroom, school, or system levels (Baude et al., 2020; Smith, 2011). A charter school teacher
may use their autonomy to design and implement a new program specific to meeting the needs of
her classroom or a charter principal may use the approved charter to implement a program that
serves the unique mission and vision of the school. We acknowledge that traditional school
districts also implement innovation to varying degrees. However, the charter school movement
was specifically conceptualized as a way to bring speed to innovative processes, that without a
district-level administrative office slowing things down, charters could instead use autonomy
from district controls to adapt more quickly (Neeleman, 2019; Smith, 2011).

There are three school-level innovations that are most common at charter schools:
technology-based virtual learning, specific curricular immersion programs, and extended
learning hours (Price & Leary, 2021). All three practices can have positive effects on student
learning outcomes when implementations are well planned, proper training is provided, and
appropriate resources are allocated to the program.

Design and Development Processes

Against the backdrop of Bloom’s 2 sigma problem and the ability to innovate as a charter
school, the founding group set about to design the school in a way that maximized one-on-one
tutoring and mastery-based learning. We made two key design decisions related to this effort.
First, we changed the student educational model from a traditional K-6 direct instruction
classroom with students in the same room all day with the same teacher, to something more akin
to a junior high/high school model with rotating classes. Second, we changed the traditional teaching model from a licensed teacher assigned to the same 25 students all year long, to a model that included a hierarchy of three different levels of teachers to benefit from economy of scale principles: academic coaches (essentially pre-service teachers), part-time mentors, and full-time lab directors who would teach different rotating classes throughout the year.

**Rotating Class Model**

Although an elementary school, by having students rotate classes, we could allocate more resources to some classes than others, meaning less expensive classes could help fund more expensive classes that included one-on-one tutoring. The rotational model also positively impacted other issues important to us as founders, such as student movement, recess, and breaks. We were convinced that elementary students in particular had lost important recess time as the emphasis on standardized testing grew and recess time diminished and that these breaks were essential to learning (Chen, 2017). At the time in Utah, recess did not count towards instructional time. We were intentional in our design decision to have students move from classroom to classroom in a similar way to a high school, rather than the typical elementary model of one main teacher per room with limited visiting specialization teachers, such as those teaching art and music, rotating among the different elementary classrooms. This decision was made for the purpose of getting students moving and having a break at regular intervals throughout the school day.

Such a model would also allow for students to receive more personalized instruction by being able to attend classes at their level or based on their interests. For instance, we envisioned a robust music and arts program. Students with an interest in orchestra could attend those classes, while other students more interested in drawing could attend art class. Similarly, a third grade
student with a fifth grade understanding of math could attend a class more advanced than typical peers, while a student behind in reading could attend reading classes at their own level and/or attend extra reading classes.

We settled on a rotational model with three distinct classes: Engage, STEMRec, and Foundations. Although some aspects of this design were influenced by the 2 Sigma problem, as founders we also had other interests and graduate class experience that impacted our decisions, such as a desire to increase student autonomy, meeting students at their interests and levels, and providing a well-rounded experience.

Engage classes were envisioned as hands-on, project-based, experiential type classes that would instill a sense of wonder among students. They would be thematically based and initially cover seven subject areas: literacy, math, science, social science, art, music, and wellness. Each of these seven areas would have its own “lab director” who would have their own dedicated “lab” room. The lab directors were envisioned as highly trained teachers and experts in the field with master’s degrees. We hoped to find teachers deeply passionate about their subject areas and that this passion would be passed on to students. We knew that no matter how great an elementary school teacher was, they were often better teachers in some areas over other areas. For instance, an elementary teacher might be great at teaching math but not as great at teaching art. By employing an artist with a teaching license, students would get authentic education by someone passionate in their domain.

We also recognized that young students need to move and that sitting at the same desk for hours on end can lead to burnout. We were particularly struck with the benefits of children’s museums and their ability to evoke excitement, wonder, and interest in young students. We also saw play as an essential component of developing soft-skills and learning to get along. In
gathering examples of children’s museum exhibits from across the country, we developed a vision for a mini children’s museum type experience within the school that would focus on “meaningful play.” We named this meaningful play area “STEMRec” to indicate an area for hands-on science, technology, engineering, and math combined with “recreation.” STEMRec was meant to address the need for play as well as fulfill educational goals.

During the building’s design phase, we dedicated a 5,000 square foot open space as STEMRec to be filled with hands-on activities, a play structure, board games, legos, and more. A photo of the finished STEMRec area is included as Figure 2. In this photo of STEMRec, the 22-foot high play structure, Lego® table, iPad with Osmo® games, and giant Connect Four® games are visible. Other STEMRec features out of frame include a small garden and animal center, built-in race track, and maker space. The students are gathered for a short morning meeting before they are dispersed to the various activities from which they can choose.
Figure 2

*STEMRec at Franklin Discovery Academy*

As seen in this photo, STEMRec is centrally located in school, with the classrooms and gym surrounding it. The original design for the school, as included in the charter, and the finished floor plan, is included as Figure 3. On the left is the design as conceptualized by the founders and on the right is the floorplan developed by the architect. Although many things changed over the course of working with the architect, STEMRec in the middle with the classrooms surrounding it remained. The Engage classrooms are located on the first floor, while the second floor follows the same pattern and includes all of the homerooms for the Foundations classes.
Note. This figure includes the plans for floor 1. The building also includes a second floor with the same general design.

The class that would cost less per hour to operate, but still occupy a critical role in the overall model, would be called “Foundations” and be centered on computer-based mastery-learning. While in Foundations class, students would have dedicated computer time to advance through a computer-based curriculum focused on foundational knowledge. Students would be permitted to go as fast, or as slow, as needed to demonstrate mastery of the curriculum. Foundations would cover the breadth of learning standards, while Engage classes would cover depth.

We envisioned developing the Foundations curriculum ourselves since we all had deep interests in instructional design. The Foundations curriculum would follow a mastery-based structure as envisioned by Bloom (1984). Students would work to complete a unit of curriculum
at their level, do an assessment, and then continue working through additional material until they could demonstrate mastery. Students would receive some level of one-on-one attention during Foundations time. Each homeroom, the location where students would work on Foundations, would be staffed by multiple academic coaches who would monitor students while they worked on the computer-based curriculum. If a student got stuck, the academic coach would provide one-on-one tutoring and explain the problem and then the student could move on in the curriculum.

The homeroom would also be home base for the student’s mentor. The mentor would be a licensed teacher assigned to monitor the student’s progress through the curriculum and school program, set their schedule, and maintain parent contact. Each student would be scheduled for a one-on-one interview and tutoring time with their mentor on a weekly basis. This one-on-one time would allow the student an opportunity to receive highly personalized tutoring for the topics the student was currently learning in the Foundations curriculum.

Initially, we planned to have student schedules completely customized to their individual preferences where each student would rotate to a new class each hour. Because of those logistical challenges, we developed a job role of a “program manager” to figure out how schedules would be managed. To add to the logistical challenge, the charter also called for allowing parents to pick their students' school start time at anywhere between 7:30 and 10:30am and an end time between 2:30 and 5:30pm. We had wanted to make sure the school worked as a support for parents in meeting their family needs, rather than forcing all parents to meet the needs of a school with single start and end times. We wanted to include elements of autonomy for both parents and students wherever possible. Although the perfect software to manage the scheduling
proved elusive, the new program manager found a system from ASAP Software to initially manage scheduling.

A visual representation of three different sample student schedules is included as Figure 4. This figure shows how some students arrive and leave at different times and go to different Engage classes based on their choices and/or academic levels. Because each student’s schedule is highly customized to the specific student, students and parents had a level of autonomy not found in the typical elementary school experience.

**Figure 4**

*Three Sample Student Schedules*

<table>
<thead>
<tr>
<th>Time</th>
<th>7:30-8:30</th>
<th>8:30-9:30</th>
<th>9:30-10:30</th>
<th>10:30-11:30</th>
<th>11:30-12:30</th>
<th>12:30-1:30</th>
<th>1:30-2:30</th>
<th>2:30-3:30</th>
<th>3:30-4:30</th>
<th>4:30-5:30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Grader 1</td>
<td>Foundations</td>
<td>Art</td>
<td>Recess/Lunch</td>
<td>1st Grade Math</td>
<td>STEMRec</td>
<td>4th Grade Literacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third Grader 2</td>
<td>STEMRec</td>
<td>Music</td>
<td>3rd Grade Math</td>
<td>Foundations</td>
<td>Recess/Lunch</td>
<td>STEMRec</td>
<td>Drama</td>
<td>3rd Grade Literacy</td>
<td>STEM</td>
<td></td>
</tr>
<tr>
<td>Third Grader 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Differentiated Teacher Model**

A new model for teachers was required to support the unique rotating class model for elementary-aged students. Instead of a traditional “teacher,” we envisioned academic coaches, mentors, and lab directors. Not only were these different teacher categories seen as necessary to support the rotating class model, but they were meant to address issues with the teaching profession that teachers often cited as a difficulty with the profession. During the research phase for writing the charter, we interviewed many teachers and visited a variety of schools. The two issues cited most frequently among teachers were, not surprisingly, concerns about pay and lack of autonomy.
We felt that teacher pay could be addressed by utilizing economy of scale principles and targeting specific teaching roles to certain positions. Traditionally, a teacher is responsible for all aspects of his/her classroom. They are high-level classroom managers, curriculum designers, discussion leaders, speakers, lesson directors, student work graders, emotional support providers, parent managers, cleaners, and tutors. We wanted to divide up the work by the level of training required and pay more for the work that required more training. The lab directors would be the highest level and highest paid full-time teachers because they would be subject matter experts in their fields with master’s degrees and have curriculum design experience. They would be responsible for developing the Engage classes and the Foundations curriculum in their area. They would have substantial autonomy to develop the classes and curriculum as they saw fit and teach the Engage classes that they had developed themselves. The pay scale for the lab directors would be at least 20% higher than the pay scale for competing district jobs. Part of the additional pay would come because the lab director position was set-up as a year-round position. During the interviews, we noted how a majority of teachers obtained other summer employment. We wanted the lab director position to be the equivalent of the “summer job” for the teachers so they would not have to go get another job and the school would benefit from the additional curriculum development during the summer months.

The next level of teacher was designed as the “mentor.” The mentor position was also imagined as a response to the fact that many licensed Utah teachers had a preference for part-time work, but the best they could do in the districts for part-time work was as a teacher’s aide. Except for some kindergarten positions, most districts and charter schools did not have part-time positions for licensed teachers that paid them an hourly rate equivalent to a full-time licensed teacher. Although the hourly rate for the mentor would be closer to the hourly equivalent of a
district teacher, the overall cost to the school would be substantially less by not having to pay
benefit costs. These savings would help pay for the additional academic coaches needed for the
one-on-one tutoring.

The mentor was also viewed as the student’s official “teacher of record” who would be
responsible for communicating with parents, establishing the primary teacher-student
relationship, and student progress monitoring. This teacher though, would not have any
responsibilities for lesson plan development or traditional direct instruction. By removing those
duties, we hoped to create a more family-friendly teaching position that would not require
grading papers on nights and weekends or developing curriculum after hours. Those duties were
instead allocated to the Engage teachers. The mentor would spend their day primarily working
one-on-one with students, monitoring their progress in the curriculum provided to them, and
providing remediation where needed.

Academic coaches were the third teacher-level envisioned in the charter. They were seen
as more equivalent in experience and pay to a teacher’s aide type position. The school targeted
these positions to preservice teachers enrolled in teacher education programs. An important
component of Bloom’s research was to show that because one-on-one tutoring is so effective,
even novice tutors could tutor with effective results (Bloom, 1984, p. 5). Although we knew we
would not be able to pay the academic coaches teacher-like wages, a lower paid college student,
with minimal training and experience, could still provide impactful tutoring. We envisioned jobs
that included a level of flexibility for the academic coaches' shifts so that they could work around
their own college schedules. We subscribed to Human Resources philosophies concerning the
need to target specific jobs to specific groups in a way that filled more than just financial needs,
but helped them meet their career growth goals. Although the academic coaching jobs were
mostly entry-level, we hoped to appeal to pre-service teachers in a way that helped them meet their goals and rewarded them with relevant experience and job flexibility.

Challenges of Implementation

After receiving a charter from the state of Utah in May of 2015 and spending an arduous year assembling a staff, building a building, and recruiting students, Franklin Discovery Academy opened its doors to students for the first time on August 21, 2016. Like many charter schools, the initial opening had a multitude of startup difficulties. The building’s temporary occupancy permit arrived only 48 hours before the school opened. All move-in and set-up happened over those 48 hours before school started. Five hundred and two students came that first day. Some of the chaos from that day included many elements, (a) students and teachers alike not knowing where to find their classes, (b) having a fire alarm go off because plumbers were welding in the not fully completed building, (c) a problematic evacuation because of heavy machinery still moving around in the backyard, (d) nobody knowing how to operate the new phone or PA systems, and (e) a multitude of little things such as not purchasing trash cans or clocks as part of the furniture purchase.

Although the facility challenges were large and daunting, they were manageable. We quickly learned that despite a two-week long training session with all staff in a hotel conference room prior to opening, nothing but time and experience could develop the essential institutional knowledge every organization needs in order to operate. Every single student and employee were new to the school and to the model. A bigger issue and worry was that the custom scheduling for students and curricular programs did not work according to plan. Most significantly, the Foundations curriculum was not in place. As founders we were worried neither the students nor the employees would show up for day two, but remarkably, almost everyone did. Over the next
several months, the founder’s group and staff were able to chip away at scheduling and curriculum issues, but many challenges remained.

**Challenges of the Differentiated Teacher Model Decision**

During the summer before opening, the founding group, along with the new executive director hired to run the day-to-day operations, held open houses for parents. We presented the school’s philosophy of personalized education and vision for how the school would operate. During those meetings, a persistent question from parents was “well, who is their teacher going to be?” None of the three “teacher” positions had the word “teacher” in the title. Right before opening, the team decided to change the names as listed in the charter from “mentor” to “mentoring teacher” and “lab director” to “master teacher.” Both of these groups were licensed teachers and part of the answer to the parents’ question of who their student’s teacher would be.

Once school started, our most significant lesson learned was that nothing but time and training could develop the skills and institutional knowledge needed to successfully run the school. Secondly, we discovered the critical role of being flexible and willing to iterate. With a new, from the ground up model to execute, everyone had to be willing to accept frequent changes. As noted prior, we provided a two-week training course for all staff just prior to opening. The program was held at a hotel off-site because the building was not finished.

Although there was general excitement among the staff to be part of something new, there was also frustration over the amount of how many new programs, systems, and procedures there were to learn, with one new staff member musing at training, “how can we possibly open next week when we don’t even know how to clock-in or take attendance.” Even something as simple as clocking-in required training on a system new to everyone, practice, iterating, and trying again. The school’s first choice of an employee time management system proved
untenable due to the difficulty staff had in using the phone-based app, and so the administrative team changed systems during the middle of training, which then necessitated all new training.

Because not all student curriculum and scheduling pieces were in place, the staff could not train on something that did not exist, and so the training was often more theoretical than practical. The mentoring teachers were given a vision of how the homeroom time was supposed to work and what they would do with Foundations, but they did not actually get training on scheduling or curriculum. Once school started, they were left wondering how to fill the Foundations time. Some mentors could translate what they had learned of the vision for Foundations and find online and printed curriculums that met the vision, but for others it was intensely frustrating. Before providing a school-wide Foundations curriculum a month-and-a-half after opening, two mentoring teachers resigned in frustration.

The founders and administrative team quickly learned that choosing staff with the right “fit” to the school’s mission and vision was critically important. The school was different and teachers who had spent significant time in traditional schools were often too ingrained in traditional methods to adapt to the new model. We learned that those willing to be flexible could best tolerate the quick pace of iterating. The autonomy granted to a charter school provided the basis for rapid iteration. We did not have to wait for a district board to give permission to make changes. Instead, we had the autonomy we needed to make quick decisions and implement rapid responses to particular situations.

A positive development from the constant iterations made by the team was a growing culture of resiliency among the staff. The staff joked about “change” being the school’s middle name. With so much of the model being new compared to traditional education, just about all pieces of the school day involved new types of procedures. The charter spelled out the vision, but
the staff had to figure out how to convert the vision to operations. For instance, the charter includes a discipline policy centered around the idea of logical consequences, but the charter did not cover all of the creative ways students could misbehave. As founders, we were opposed to taking away recess as punishment or zero tolerance policies as blanket responses to misbehavior. Teachers and administrators struggled to implement consistent disciplinary rules that matched the vision of logical consequences with the limited examples provided in the charter. The disciplinary procedures were updated several times during the beginning months, requiring more training, but adding to the staff’s developing resilience.

Another iteration in particular provides a useful example. At the time of opening, students assigned to the same mentoring teacher could be assigned to their homeroom for Foundations at any point in the day, meaning a teacher’s assigned group of students were never in the homeroom together at the same time. Both teachers and students complained about the lack of a “community” or “class” that was their own. Each student encountered many different adults throughout the day, but if someone were to ask a student who their teacher was, the answer was always the mentoring teacher. We quickly learned that, with this young age group in particular, a sense of community and belonging was critical. Halfway through the year, the scheduling system was changed to put all students of a particular mentoring teacher together for at least some of the homeroom time so that students could be part of a “class.” This change provided a necessary balance between changing classes in a high school-like rotational model and the need to be part of a consistent class with the same group of classmates that students would see daily. Although the classmates from the Engage classes would change with each term, the classmates in their homeroom would remain the same all year.
In broad terms, the basis for having three different teacher levels, each with a different role and responsibility to students, provided many of the benefits we envisioned. Although there were challenges getting those in all three groups to stay in their lanes, the roles developed mostly according to plan. The master teachers focused on developing their Engage classes, the mentoring teachers focused on the homerooms and Foundations, and the academic coaches provided support in the homerooms, although not entirely according to plan. It had been intended that the academic coaches would provide much of the one-on-one tutoring envisioned in the charter, but in practice they spent the majority of their time on classroom management. The mentoring teachers also were to provide tutoring, but necessities required that they spend an inordinate amount of time on scheduling. As a result, in practice, students were not getting the amount of tutoring envisioned in the charter. Throughout the year, the founders and administrators worked to improve the operational challenges so that teachers and academic coaches could put their focus where it was intended. Although iterations and improvements were consistently made throughout that first year, the inaugural year ended with much of the teacher time spent on operations and classroom management over tutoring.

**Challenges of the Rotating Student Model Decision**

The implementation of an entirely new student model for K-6 education proved to be a difficult and lengthy process. The model centered on putting each student’s individual needs at the center. This led to significant changes from traditional norms in scheduling, start/end times, classroom rotations, and curriculum. The challenges from customized scheduling alone proved daunting. Not only was each student able to be dropped off and picked-up at their own custom times, they all had custom schedules in-between, going to different places every hour throughout the day. One person commented that it was like trying to manage “500 custom homeschools
schedules.” A teacher was overheard in a moment of frustration saying, “Did Jenn really have to change everything about school? There’s a reason it’s been done the way it has forever.”

For the first three weeks of school, the custom scheduling solution was not ready, and so the students generally moved by cohort groups, managed within an Excel spreadsheet while the program manager worked on a solution that would support the customization envisioned in the charter. This group movement meant that for three hours in the morning and three hours in the afternoon, students were coming and going during the middle of classes. If, for instance, an Engage class met from 8:30 to 9:30am, but a student in that group did not arrive until 9:00am, they then joined in during the middle of that particular Engage class. These scheduling issues caused frequent disruption in the morning and afternoon classes.

Afternoon pickup was even more challenging since most students did not understand exactly when they should head to the front door. Further, many younger students could not tell time and the lack of clocks in each room added to the difficulty. Initially, the staff bought colored wrist bands to indicate the ending time, but those only lasted a few days. The staff switched over to colored sticker dots on the name tags to indicate a student’s pick-up time. For instance, a green dot indicated pick-up at 2:30 pm whereas a blue dot was 2:45 pm. During the afternoon, the front office group got on the PA at different times and would announce that it was time for everyone with a particular colored dot to leave. The afternoon pick-up was especially difficult on the master teachers because of the constant PA interruptions. Not only were there announcements every 15 minutes for the different groups to leave, but when a student did not go out on time, they were individually paged over the intercom. This led to several dozen interruptions during Engage classes every afternoon.
The staff was able to adopt custom schedules for students one month after the start of school using software from ASAP called ASAP Connected. The software had been designed for afterschool programs, but was as close as the administrators could find to something that could manage custom scheduling within their limited budget. ASAP Connected worked similarly to a college course management system. Master teachers could set up individual “courses” and mentoring teachers could select the ones they wanted for their students. Each course had individual “classes” set-up for specific times (e.g., one course might have three classes offered at 9:30, 10:30, or 11:30 am). Each class also had a specific number of seats for the mentors to select. Once they were all selected, the class was marked as full. Initially, master teachers were given the ability to set-up all of their specific classes and times. The scheduling process was slow and laborious for mentoring teachers, taking about an hour per student per schedule. After the schedule was set, the teachers made a name tag for the student with their schedule on it. Each mentoring teacher had to enter the student’s schedule into a separate document for the name tag manually since ASAP Connected did not have a name tag print option. Making name tags for the entire class was also a time-consuming process, taking each mentoring teacher several hours to generate and print name tags for their students.

During those first few months, master teachers were given the responsibility for setting up their courses and corresponding classes in ASAP Connected. In general, this delegation of duties was necessary because of the sheer amount of time required to put everything together, but it also led to some problems. For instance, some master teachers decided they should have class size capacities of 10 students. Such a low capacity would, of course, be very nice and lead to a lot of individual attention, but the school did not have the financial resources for the classes to be that small. Mentoring teachers, master teachers, and the program manager had to work together,
often sending many emails back and forth, in order to put all schedules together and find seats for all students for all open spots in their schedules. With each student averaging 7 open slots to fill, and 500 students, that meant at least 3,500 individual blocks of time to schedule each term.

Not everybody was happy with the results. Sometimes a seat for a class a student really wanted was just not available, or a student ended up in a class they really did not want, or the Engage class had more students than a teacher wanted. The mentoring teachers spent hours and hours on scheduling, but wanted to be spending that time working directly with their students, which had also been the goal. During those early days, the difficulties of scheduling were often described by mentoring teachers as the hardest part of their job, as noted by one third grade mentoring teacher, “I love not having to grade papers on the weekend, but having to find seats for all of my students is almost as bad. I spent all day Saturday making name tags. The model for my students is what I want, but for us as teachers, it’s not sustainable. Something’s gotta give fast.”

A bright spot in the difficulties was the success of the Engage classes themselves. In most cases, the students really enjoyed going to each of the different classes in math, science, literacy, social science, art, and music. Not every master teacher hired was a good fit to the model, but most were. Unlike curriculum difficulties in Foundations, which is discussed below, the Engage teachers were able to prepare and deliver their own custom-designed curriculum for their classes. The art teacher, for instance, taught classes on cartooning. The music teacher started a choir class to prepare for a Veteran’s Day concert, and the science teacher had students start a grow box garden in the window of her room.

In general, parents were patient about the other challenges because their students were enjoying, and growing, from their Engage class experience. Students, teachers, staff, and parents
were all new to the rotational Engage program. They were used to the normal elementary structure of going to one classroom and spending the day there. With Engage, students got to experience the passion each master teacher had for their area of expertise. Parents were forgiving of other shortcomings because they saw how much benefit students were getting from Engage.

We received many kind emails from parents who acknowledged difficulties with some parts of the model, but that the different class options were very quickly making a big difference in their students' lives. Several parents mentioned how their children had previously fought going to school, but with the variety of Engage throughout the day, their children were more excited about attending school than they ever had been. One parent sent a touching note about the impact of the classes by saying, in part,

thank you for doing something so new and different. You’ve changed the trajectory of my son’s life because at a regular school, he’d be labeled a troublemaker and put in a death spiral of punishment. He loves being able to pick his classes and be involved in how his day goes. We knew when we signed on to a new school there would be growing pains, but we’re patient, because we can already see the difference.” (J. Price, personal communication, November 12, 2016)

Another parent sent a grateful email about how they were able to end their child’s dependence on anxiety medication after they started attending (J. Price, personal communication, October 23, 2016).

Several parents even commented with astonishment how their students kept asking to change pickup times to stay later and later at the school or “escaped” back into the school after being sent outside for pickup. Over time, the administrative team received many emails from
parents about how their children get upset if they get checked out early or do not want the school closed for a holiday, such as the parent who sent the following note:

When my kids were attending normal public schools (they were at different schools due to being in different language immersion programs), I would occasionally drop by to pick them up a little early if I happened to be nearby school and didn't want to go home and then come and get them shortly after (we didn't live close by). They were always SO EXCITED to get checked out early. Well, one time soon after starting at FDA, I stopped by to pick them up early, and all I got was complaints. Then on my daughter's birthday a few weeks later, before she left for school, she told me, "DO NOT CHECK ME OUT EARLY FROM SCHOOL." We used to have a tradition of always checking the kids out early on their birthdays, but not anymore. In fact, about a month ago I decided to get the kids early one day (I almost never do, but it had been a long time since I tried, so I was thinking maybe they didn't care anymore and it was going to save me a lot of time and gas to get them out a little early). All four of my kids were upset with me for checking them out. They complained so much that after having checked them out and starting to drive away, my husband suggested we just bring them back and let them finish their day at school. So, I showed up less than 5 minutes after having checked them out to check them back in. They only had one class left, but they all wanted to attend that class.

(personal communication to J. Price October 12, 2021)

**Foundations Curriculum Challenges**

As noted earlier, a key part of the model was the Foundations curriculum that would be a computer-based mastery system and relatively inexpensive on a student cost-per-hour basis compared to regular teacher-led classes. This curriculum would allow the school to spend
additional money on tutoring and the Engage classes. Because the founding group mostly came from an instructional design background, we had grand plans of creating this curriculum in-house. We had the interest, background, knowledge, and talent required to develop this curriculum. What we lacked, however, was time. It had been intended that we would develop the curriculum during the planning year from August 2015 to the August 2016 opening. We also intended to involve the master teachers in Foundations curriculum development. The master teachers would get an initial sampling of the curriculum we developed as the founders and then they would expand, monitor, and further improve it.

However, as the preoperational year progressed, the challenges and demands of starting a school completely from scratch greatly interfered with our ability to spend the time needed to develop it. Each month went by with the school marching closer to opening with very little of the curriculum developed. In keeping with our philosophy of mastery-based learning, the curriculum was divided into ten “levels” rather than grades. Students would complete a level of math, for instance, and then move to the next. The 10 levels would encompass all learning standards from grade one to grade six. A student would be encouraged to work through the levels at their own pace. In doing so, a student in third grade could be working on the same level as a student in grade six.

We chose Canvas as the learning management system (LMS) for this curriculum. We developed a template for each level and the kinds of assignments and requirements a student would need to complete to move to the next level. Each level included various background information to watch and/or read, assignments, and mastery-based assessments. Despite the best of intentions to put together the curriculum, we only completed one level. By the time all master teachers were hired and working in June 2016 and with the school’s opening only a month away,
they needed to be working on the class plans for their Engage classes, and so they too had no
time for the Foundations curriculum development.

Due to the lack of curriculum, the mentoring teachers were instructed, without much
detail or direction, to find educational activities during the times students were scheduled for
homeroom. Students ended up getting a hodge-podge of printed worksheets and activities during
Foundations time. We sought to fill the void in the Foundations curriculum by purchasing an off-
the-shelf computer-based curriculum that followed mastery-based principles. In late September
2016, almost two months after school started, the mentoring teachers were able to start using
software by iReady® as Foundations curriculum. The roll-out had many challenges since both
teachers and students were learning the software at the same time. Although the curriculum
challenges were still daunting in that many teachers and students did not care for iReady®, with
that implementation, the overall initial structures of the school were in place.

**Design Insights and Implications**

In starting a school from scratch, we experienced first-hand the difficulty of translating a
new design on paper to an operational venture. Although the written charter provided an
intentionally designed school model, the first months and school-year were filled with frequent
iteration. Those who were flexible, able to participate in quick iteration, and resilient fit best as
staff members.

The resilience of the staff can best be attributed as the reason for the school’s ability to
survive the difficulties of year one to a now stable school several years later. That emergence
was not a foregone conclusion. The school could have joined the ranks of failed charter schools
with the sheer number of difficult challenges encountered during start-up. During that first year,
an employee sent the administration an email that read, in part,
I was drawn here because you are attempting to implement a new educational philosophy and I was both curious and hopeful you had answers to some of our most vexing educational problems. Despite the school’s current situation, I do believe your trajectory is in the right direction. Setbacks are part of the process and must be expected. We all know change is difficult; one must expect bumps and bruises along the way.” (J. Price, personal communication Feb 28, 2017).

The school encountered real, and at times overwhelming, challenges in almost all areas of operation, but it responded with what it did best: iteration towards improvement. As founders we and the staff worked hard to retain the unique elements of our design while meeting the requirements to operate as a school.

Design priorities in this case emerged, shifted, and changed as the design moved from paper to practice. Implementation was facilitated to the degree the team was flexible during the progression of the design from paper to reality. The team attempted to balance the principles of focusing on a shared vision with operational realities. The benefits of designing from a blank slate meant a potentially higher level of innovation, but also required a higher degree of intentionality in design over taking an existing design and modifying it.

Our experiences as founders help illustrate that a primary challenge of design requires balancing design with implementation. School began with zero institutional knowledge. With the design implementation, we as founders and the staff learned that institutional knowledge cannot be bought—it can only be developed with time, training must be frequent and thorough, and we must have realistic time estimates for implementation.

Now five years later, the lessons learned, particularly those on flexibility and iteration, have been critical for a number of challenges that have arisen since, most recently COVID-19.
pandemic. The school’s continued flexibility and ability to iterate allowed it to pivot quickly throughout the pandemic, leading to continued enrollment growth during the challenging 2020-21 school year when most of the surrounding charter schools lost enrollment.

**Conclusion and Future Iterations**

Because charter schools are schools of choice, meaning that no student is required to attend, one way to measure the success of a charter school is its enrollment numbers. If parents are choosing to attend, the school presumably must be providing an education desired by parents. Keeping this measurement in mind, despite the many challenges of start-up, particularly those in the first year, Franklin Discovery Academy has managed to grow year-over-year, every year since its inception, by roughly 6%. Such growth can be viewed as one indicator of a successful, though challenging, implementation. Our experience highlights the importance of an intentionally designed program that can withstand the difficulties of operational execution in new and uncharted territories that also lays the groundwork for improvements. Our experience also suggests several areas for future consideration, such as how charter creators can speed the development of institutional knowledge, how to identify the right fit in employees, and how to support quick iterations while developing resilience.

**Afterward**

This paper details the design decisions and experiences of a group of charter school founders. The difficulty of their experience is not dissimilar to that reported in the literature. Indeed, even the titles of research articles and book chapters related to charter school start-up evoke pictures of long-term challenging situations and immensely daunting undertakings, such as “Building a plane while flying it: early lessons from developing charter schools” or “Adventures of charter school creators: clawing your way” or “When the ‘dream’ turns into a nightmare: Life
and death of Voyager Charter School” (Deal et al., 2004; Griffin & Wohlstetter, 2001; Karanxha, 2013). Although limited in quantity, this literature paints a consistent picture of the challenges of charter school start-up.

In using keyword terms such as “design case charter school” or “charter school startup” in a search of ERIC, EBSCO, and Google Scholar, we found only a few dozen relevant articles that were similarly situated as design cases focused on charter school start-up. The story they tell highlights the complexities involved in starting both a new business and a new educational model with numerous stakeholders all at the same time. A typical new business might only involve three or four primary stakeholders, such as the founder, the financier, employees, and customers. With a new charter school, that stakeholder list increases exponentially to include, at minimum, founders, charter authorizers, state boards of education, parents, students, teachers, administration, federal agencies, bond-holders, building developers, and several different state and federal regulatory agencies.

The difficulty of a startup is seen in the fairly high failure rate for charter schools. A report recently released by the Network for Public Education stated that between 1998 and 2014, over 18% of charter schools failed within the first three years of start-up (Burris & Pfleger, 2020). They also document that 40% of charter schools close before their fifteenth year. Despite the difficulties, enrollment in charter schools continues to grow with new charters starting-up each year (NAPCS, 2019).

The current design case literature related to charter school start-up tells a story similar to ours: implementation is difficult, but possible. A common thread is the cautionary tale that without resolve and dedication to the implementation, failure is possible. Design case researchers note the importance of flexibility in the development of the school and accountability for
governance and administration (Burris & Pfleger, 2020; Karanxha, 2013). The literature highlights one area of particular concern, that of realistic financial planning. A new school can quickly get itself in trouble if it does not have the money to pay its employees or bills. Because so much of charter school funding comes in arrears, first year charter schools are usually less well funded than established schools. Paino et al., in a 2014 study of charter school failures in North Carolina, wrote that “in every case, closure was based on finances not on academics.” (Paino et al., 2014, p. 31). Other design case researchers emphasize the importance of proper fit in leadership, particularly with regard to adaptability. Hodgkinson and Hodgkinson, for instance, wrote in 2013 about how charter leaders must be able to make start-up decisions on-demand because the charter, inevitability, will not be detailed enough to include predetermined decisions on everything (Hodgkinson & Hodgkinson, 2013).

These articles describe start-up situations that mirror the experience of the founders of Franklin Discovery Academy. We add to this growing body of literature stories that can serve to provide other founders with lessons on where to put energy and focus during charter school start-up.
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https://www.nber.org/system/files/working_papers/w28477/w28477.pdf


ARTICLE 3

Charter Schools and Innovation: A Research Study on a Virtual
Summer Reading Program for K-6 Students Following
School Shutdown for COVID-19

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Abstract

The Covid-19 pandemic led to widespread school shutdowns during the spring of 2020. Franklin Discovery Academy, a charter school in Vineyard, Utah, responded to the demands of remote learning by implementing its “FoxesRead” tutoring program, a one-on-one virtual reading tutoring program. This paper is a quasi-experimental research study analyzing the effect of FoxesRead on the June 2020 participants, their parents, and the tutors. Although the FoxesRead tutoring program was primarily a response to a quickly changing and challenging situation, it was also an attempt to bring current school practice into philosophical alignment with tutoring as championed by Bloom in his 2 sigma research and as adopted by the school’s founders. This paper describes the implementation of the FoxesRead intervention followed by an analysis of student learning outcome results. Research data is gathered from reading test score results, parent and tutor surveys, and focus groups. A split-plot ANOVA analysis revealed a significantly positive effect on the reading levels of participating students. We hope these findings provide the basis for future research seeking to find solutions for economically and effectively providing large scale one-on-one tutoring.

Keywords: summer reading program, charter school, summer slide, elementary education
Introduction

The year 2020 brought a historic halt to education when 90% of the world’s children stopped in-person school attendance during the Coronavirus pandemic during March and April of that year (Strauss, 2020). Most children stayed out of school for the remainder of the school year, leading to no in-person school for five months. Schools quickly transitioned to online and at-home learning models. Initial reports indicated that student learning generally stopped in mid-March 2020 when schools shut down (Daniel, 2020; Engzell et al., 2021). Successes and failures varied widely. Many parents reported frustrations with suddenly having to be their child’s teacher and not being adequately equipped to do so (Fetters, 2020). There were endless technology frustrations, from not having enough computers for all children in the family (or any computers at all), to adequate internet, to training on multiple edtech platforms, and to keeping track of user names/passwords (de Araújo et al., 2020; Fagell, 2020).

Many parents were also trying to suddenly do their own jobs at home due to widespread coronavirus lock downs. Trying to be a work-from-home employee, teacher, and parent at the same time became overwhelming for many (Fetters, 2020). Some parents simply opted out of school-at-home or gave up part-way through. Political leaders called for leniency and cancelled end-of-year testing (Barnum & Belsa, 2020). Given the difficulties of the sudden thrust to school-at-home and dealing with the added stress of lost jobs, sick family members, and lockdown stress, school-at-home generally became optional.

Background

Franklin Discovery Academy, a charter school in Vineyard, UT, with 640 kindergarten to sixth grade students, experienced this sudden shift to school-at-home. The school responded with a full complement of online Zoom resources and offline activities that parents could use to
continue education at home. Many parents expressed appreciation for the school’s efforts and quick response during the difficult several months of school-at-home. Few parent complaints were received. However, parent stress levels grew quickly. Zoom fatigue set-in, and some parents asked for something simpler. The full school-at-home program required significant parent support and supervision, given the general developmental status of the school’s students and them not yet being ready to self-regulate to the degree necessary to complete an online school day by themselves. In general, parents were not as concerned about getting in a full school day as they were keeping children emotionally safe and anxiety levels down. Parents who were also working from home were generally the group reporting the most stress and difficulty keeping up.

In response to parents asking for a more simplified school-at-home program, the administrative team at Franklin Discovery decided to maintain focus on a single learning goal, reading, and develop a simplified program around that. Many parents understood that other content areas and learning deficiencies could be addressed at a more appropriate time later, once the upheaval of the pandemic subsided. Franklin Discovery chose the reading focus because reading has always been its top academic priority, per its charter and the charters reliance on educational reading research documenting the foundational nature to reading of all other academic success (Duckworth & Seligman, 2006; DuPaul et al., 2004; Fleming et al., 2004, Wood et al., 2005). Franklin also chose to gear the simplified program around an individualized tutoring model because of its core belief in tutoring. Franklin’s charter was greatly influenced by Bloom’s 2 sigma paper (1984) that documented the effectiveness of tutoring.

In mid-April 2020, after a month of school-at-home, the Franklin administration sent out an invitation to all parents for a new virtual reading program called FoxesRead. FoxesRead
would match students with tutors and the student would read books to the tutor over Zoom from the education website Reading A-Z. Reading A-Z is a reading focused educational website that contains several thousand books across kindergarten (level A) to grade 5+ (level Z) books. The tutor would correct, help, and encourage as the student read the book. Parents were told that students participating in FoxesRead would then be excused from all other aspects of the school-at-home program.

Thirty-four students were signed-up by their parents for the initial FoxesRead cohort in April 2021. The school was able to utilize employees who could not do their normal job due to the shutdown, but still wanted to work and maintain income, as the FoxesRead tutors. The tutors varied greatly in their experience level with reading instruction. Some tutors had never taught reading before, whereas others had been teaching reading almost exclusively. The administrative team relied on Bloom’s research documenting that tutoring is so effective that even inexperienced trained tutors can make a significant difference (Bloom, 1984). The technology and curriculum were mostly new for everyone. Due to the nature of the situation and limited time for setup and training, only one hour-long training was held before the tutors began tutoring. The whole program was set up from the initial parent invitation to the first reading tutoring sessions in less than one week. Additional tutor training was provided once per week during April.

For that initial iteration of FoxesRead, each tutor set up their own Zoom account. Once a tutor and student were matched, an email was sent to the parents with the Zoom link and the time for tutoring. Students would login to Zoom at their assigned time and read with the tutor for one hour. The tutor brought up the Reading A-Z website, shared their screen, and then helped the student choose a book from the variety of books available. Parent involvement was kept to a minimum with just any help the student needed getting to the online Zoom meeting. Once the
student was tutoring with their assigned tutor on Zoom, the parents did not need to participate further. Most students and parents caught onto the technology quickly, and within a few days most time was spent tutoring as opposed to tech supporting logging in.

At the end of April, the administrative team polled the parents on their satisfaction with FoxesRead. Parents reported that they liked the ease of the program, that their students liked the interactions with the tutors, and they noticed improvements in their student’s reading abilities and attitudes. One of the few requested changes to the program was on the hour length. Several parents and tutors reported that it was difficult to keep students engaged in online reading for that long. Because the overwhelming majority of parents were pleased with the program, and with many anecdotal stories of success, the Franklin administrative team decided to continue the program for June 2020 and open it to any interested student. The administrative team surmised that with so much potential learning loss due to the spring school closure, parents might be interested in some level of instruction during the summer. The administration also decided to offer the tutoring for one-half hour sessions, instead of a full-hour, in response to the parent feedback that an hour was too long.

The Franklin team also discussed anecdotal evidence that the active, participatory virtual interactions with a tutor were of more benefit to students than the more passive approach of a student watching a group-based Zoom stream of instruction. During the full online program during the shutdown, many students demonstrated a lack of ability to focus during group virtual classes. The one-on-one approach provided an opportunity for the school’s tutors to help students focus and progress in the curriculum so that parents did not have to continue in the primary teacher role. The FoxesRead program, with the undivided attention from the tutor to the student, seemed to provide a solution to the major remote school challenge of getting a student to sit
down and pay attention. Students developed a relationship with their tutor, and instead of being lost in a sea of Zoom participants, interacted exclusively with their tutor during their assigned time.

For the June program, parents signed up 110 students. The school invited any employee who wanted hours to participate as a tutor. Thirty-one employees were assigned as tutors to the 110 students. They began tutoring on June 1, 2020 after attending one two-hour training, and using the same Reading A-Z program as during the April and May tutoring, except that for the June program, Franklin set up individual Reading A-Z accounts for each student. The benefit of individual student accounts was that the program kept track of the books each student had read and how the student performed on the quiz. It also allowed students the ability to create an avatar, earn stars, and spend them in a virtual rewards store. The website also had robust reporting tools that could provide information for tutors and parents on how students were doing on a variety of reading domains and track student improvement in such things as words read per minute. By making this change, students were also able to begin using the website outside of FoxesRead and earn more stars for additional reading.

For each tutoring session, the tutor logged into the student’s account and would then do a share screen over Zoom with the student. Having the tutor have control of the screen generally helped tutors maintain control of the session, but some students earned the ability to control the reading website themselves.

Franklin Discovery Academy opened back up to in-person learning on August 3, 2020. Later that month, the school administered the state-wide Acadience Reading test, as required by the state of Utah, to all of its students. This test had last been administered in January of 2020.
Review of the Literature

This study is informed by summer slide research and Bloom’s 2 sigma article (1984). We review these two areas of the literature to provide a contextual background to our work.

The Summer Slide

Although research on the COVID-19 summer slide is only just beginning and will undoubtedly be a topic for years to come, the existence of the “summer slide” in general is a well-documented phenomenon in which students lose educational ground during the off-school summer months. Research on the summer slide can be traced back to at least 1906 as documented in Cooper et al.’s 1996 meta-analysis of 39 summer slide research studies. Academic researchers have noted that students can regress 10-15% (or more) of a school years’ worth of progress during the summer months (Turner & Tse, 2015).

The slide is even more pronounced for disadvantaged students, with some scholars reporting that the cumulative summer slide for a disadvantaged student over the course of a K-12 career accounts for the bulk of the achievement gap between disadvantaged students and high socioeconomic students (McCombs et al., 2011; McGarry, 2013). Cooper et al. (1996) reported that although almost all students experience a loss equivalent to about one month of learning over the summer, economically disadvantaged student losses are more typically at three months or more (Cooper et al., 1996). Most researchers attribute the socio-economic differences in the summer slide as being related to the types of activities high socio-economic students do during the summer, i.e. summer camps and classes, parental involvement in reading, access to a wide variety of books at home, etc., versus those in disadvantaged groups that are not able to take in-person classes or have parents available for reading activities (McDaniel et al., 2017; Beach et al., 2018).
Regardless of socioeconomic status, the summer slide phenomenon has long been a concern for students across the socioeconomic spectrum with many pilot summer programs funded to address the problem (Allington et al., 2010; Ready, 2010; Terzian & Moore, 2009). Much of the current research has focused on the effectiveness of low-cost, independent summer reading programs, such as whether students having access to books during the summer or online reading programs will lead to increased summer reading and lessen the summer slide impact. In his 2020 research, Matthews reported that children who participated in library-based summer reading programs had positive reading gains and suggested a roadmap for librarians on how to increase community usage of the library during the summer (Matthews, 2021). Other researchers have reported on in-person programs, which although more costly, also seem to provide higher benefit, as noted in Nicholson and Tiru in their report on a 3-week in-person summer reading program (Nicholson & Tiru, 2019). The research is illustrative of the struggle to find cost-effective alternatives to expensive in-person instruction for a school's limited budget, but which is still effective at improving outcomes.

The 2 Sigma Problem

In 1984, educational researcher Benjamin Bloom published a groundbreaking study documenting that students receiving one-on-one tutoring with mastery learning techniques over a one-term class outperformed 98% of students taught under traditional methods of group direct instruction, a two standard deviation improvement or 2 sigma effect (Bloom, 1984). Bloom argued that these results “change popular notions about human potential” because when the best educational methods almost all students can master a subject at a high level (Bloom, 1984, p. 5).

His paper was essentially a challenge to the educational community to find something as effective as this ideal learning conduction, i.e. one-on-one tutoring, but at a more sustainable
cost. Recognizing the cost-prohibitive nature of tutoring, he sought other methods that could be done in a group setting that could be almost or just as effective. He found that some interventions approached the 2 sigma gain, but none matched or surpassed it. He also documented that tutoring was so effective that the scores from students with experienced tutors and those with inexperienced tutors were nearly the same. Just as with summer slide research consistently reporting the effectiveness of programs with human intervention as more effective than online or independent programs, Bloom’s research puts focus on the impact of personalization made possible with a tutor (1984).

Bloom (1984) theorized that a solution to finding a 2 sigma intervention might be found in the future with artificial computer tutoring or some form of mastery learning. Mastery learning, a term also coined by Bloom in 1968, is a pedagogical approach where students are expected to demonstrate mastery of a topic before moving to a new one in a cycle of assessment, instruction, feedback, and enrichment (Bloom, 1968). Mastery learning can take place in one-on-one settings, traditional classroom sized groups, or virtual programs. Bloom’s 2 sigma tutoring method included using a mastery learning approach (1984). Because mastery learning is responsive to individual needs, Bloom’s research has become almost synonymous with “personalized learning,” a term that was not in common use in 1984 but now widely cited (11 hits in Google Scholar in 1984 compared to 31,900 in 2021).

Bloom (1984) argues that the key component of what makes one-to-one tutoring so effective is the tutor’s ability to customize, or personalize, the instruction to the ability level of the student. Personalized learning is defined as instruction “that is varied in pace, method, objectives, and content for each student and tailored to the student’s interests and preferences” (Redding, 2013, p. 3). A one-on-one tutor is able to personalize both pace and path by
recognizing the current knowledge level and skill of the learner, address any missing prerequisite knowledge, spend more time on topics as needed, and test a student’s understanding as they work to achieve mastery before moving to a new topic. A tutor is able to nurture, support, and reinforce this route to mastery in a transformative way as seen in the 2 sigma effect. The “problem,” as noted by Bloom, is the expense of one-on-one tutoring and his paper was a call to find cost effective solutions within the reach of schools and communities (1984). He mused that those solutions might be found in technology.

In 1984, educational technology was in its infancy. Now some 37 years later, a variety of edtech platforms have been developed using a mastery learning model and/or forms of automated tutoring. Technology has allowed us to remove some of the economic barriers to implementation of these personalized models of instruction. Several recent research articles have shown that a technology-facilitated implementation of mastery learning can achieve learning outcomes nearly as high as those observed by Bloom (Dutta, 2014). Even after 37 years, Bloom’s paper is frequently referenced in academia, mainstream media, and technology companies as the justification for new edtech platforms that utilize a mastery learning model and/or automated tutoring. Many corporate blogs, including those of McGraw Hill Education, TutorOcean, OneXLP, include entries on Bloom and how their solutions address the 2 sigma problem and provide cost effective personalized learning solutions (McGraw Hill, 2017; Singhal, 2021; TutorOcean, 2020).

**Research Questions**

With this study, we aim to provide evidence of the effects of the FoxesRead program on students, parents, and tutors. This study is guided by the following research questions:
1. In what ways has the FoxesRead program impacted reading outcomes of participating students?

2. What are the benefits and challenges of students, staff, and parents interacting with a virtual reading program in this way?

3. What factors facilitate the perceived effectiveness of online instruction?

**Methodology**

This is a mixed methods study focused on the students, parents, and tutors of the FoxesRead program at Franklin Discovery Academy. A mixed methods study combines both quantitative and qualitative research elements in an effort to more broadly understand the data (Schoonenboom & Johnson, 2017). In her 2017 paper, “The Value of Mixed Methods Research: A Mixed Methods Study,” McKim documented the value of mixed methods research by way of its ability for researchers to draw on the strengths of both qualitative and quantitative research and add deeper context than possible with either method alone.

**Study Location**

This study took place at Franklin Discovery Academy, a K-6 charter school in fast growing Vineyard, Utah, a suburban area with approximately 12,000 residents. The school had 640 students enrolled at the time of the June 2020 program. Approximately 33% of students were from low socio-economic backgrounds, 15% had identified disabilities, and 11% had an ethnic minority background. During previous years, the school fairly consistently had 58% to 60% of students performing at grade level proficiency in reading, according to state testing data.

**Researcher Positionality**

The primary researcher is an educator with 20 years of experience. The researcher is also Founder and CAO of Franklin Discovery Academy. This study was first conceptualized as an
administrative project to justify the continuation and expansion of FoxesRead apart from the Covid-19 pandemic. Like all schools across the country, Franklin Discovery was awarded various Covid-19 relief funds intended for use to address “learning loss” related to the pandemic. The researcher and the rest of the administrative team felt that the anecdotal evidence supported using the relief funds to expand FoxesRead to more students the following school year. The cost of providing one-on-one tutoring is significant, but the Covid-19 relief funds provided a reasonable way to fund the program.

Care has been taken to address possible bias as a result of researcher positionality. Studies point to potential embedded bias of researchers with peripheral relationships to the processes they are studying (Bourke, 2014; Lin, 2015). As noted by Bourke in 2014, “it is reasonable to expect that the researcher’s beliefs, political stance, cultural background (gender, race, class, socioeconomic status, educational background) are important variables that may affect the research process” (p. 2). Because the study was sponsored by the school’s lead administrator, participants likely made an effort to be more responsive than if an outside researcher were requesting the information. Accordingly, the researcher benefited from an improved timeline and response rate on the qualitative aspects of the study. However, the pre and post testing data appears unaffected by the position of the researcher because it was collected in the normal course of operations before the study was conceived.

Participants

One-hundred ten students ranging from kindergarten to sixth grade participated in the June 2020 FoxesRead program. Quantitative data was collected from the students in the form of pre and post-reading scores from the Acadiance Reading test, a Utah state-mandated reading test for all Utah elementary students in grades K-3 and formerly known as the Dynamic Indicators of
Early Literacy Skills test (DIBELS). The test is optional for higher grades, but Franklin Discovery Academy, like many other schools, administers this test to all students. Unless the students’ parents had opted them out of standardized testing, these students were tested on reading achievement levels in January 2020 (pretest data) and again in September 2020 (posttest data). Qualitative data were collected from parents of participating students and the 31 tutors employed by Franklin Discovery Academy through surveys and interviews.

**Data Instruments**

Four data collection instruments were used to answer the research questions in this study. A copy of Institutional Review Board (IRB) approval for this study is provided.

**Student Reading Assessment Instrument**

Student Acadience Reading data from January 2020 and August/September 2020 for all students was provided by Franklin Discovery Academy. The data included the scores for each of the four or five subsections of the test (the number of subsections varies by grade) and the student’s overall composite score. The test data also included certain biographical metadata for each student, including grade, gender, socio-economic status, disability, English language learner status, and years as a student at Franklin Discovery Academy. Because the test is administered statewide, its use also provided the advantage of being able to compare pretest and posttest data over the same timeframe to all Utah students.

Teachers at Franklin Discovery Academy undergo training on how to administer the test and complete a testing ethics training module. The test is administered individually by the teacher to the student and takes approximately five minutes per student. Upon completion of the test, each student has a numerical composite score along with a color-coded grade level
equivalency: reading level of above grade level (blue), grade level (green), below grade level
(orange), and well below grade level (red).

The Acadience Reading test measures early literacy and reading skills from kindergarten
to sixth grade and is administered by the assessment company Dynamic Measurement Group.
Approximately 2 million students in the United States per year take the Acadience Reading test
(Dynamic Measurement Group, 2019). In Utah, all kindergarten through third grade students are
required to take the test unless opted out by a parent. Approximately 35,000 kindergarten
through third grade students take the test during each of the three testing periods (Price, internal
access to state testing dashboard, 2021).

According to a technical manual prepared by DMG on the Acadience Reading test, it is
designed to be a quick assessment given three times per year. The company also produces other
progress monitoring resources for weekly reading intervention programs. However, this study is
focused on the main Acadience Reading Benchmark test administered three times annually. The
company has released a technical manual that extensively addresses the test’s reliability and
validity. The manual breaks down each sub section of the test, describes its theoretical
underpinnings, reports on relevant peer-reviewed research, goes over the test construction, and
reports on reliability and validity. Based on multiple internal and external studies, they note that,
“reliability coefficients are consistently high across all three forms of reliability. The magnitude
of the coefficients suggests that Acadience Reading possesses little test error and that users can
have confidence in test results. With repeated assessment across multiple forms, reliability
increases substantially, as noted where the estimated three-form reliability is reported.”
(Dynamic Measurement Group, 2019, p. 89). Regarding validity, the Acadiance group presented
evidence of studies that “the effect size of the Reading Composite Score based on Cohen’s d is
large across all grades. Overall, the Reading Composite Score adequately discriminates between these two distinct levels of reading skill at kindergarten through sixth grade levels” (Dynamic Measurement Group, 2019, p. 106).

**Parent Survey**

A parent survey was delivered via online survey tool Qualtrics.com. This was a 17-question survey that is included as Appendix B. The questions focused on measuring the parent’s satisfaction with FoxesRead, the value parents placed on the program, and their perception of student growth. Questions included several Likert scale questions and open-ended qualitative comment boxes. Parents also had the opportunity to provide suggestions for program improvement and suggestions on how the program could be executed more effectively by parents at home during a school closure situation.

**Tutor Survey**

A 14-question survey for tutors was also delivered via Qualtrics. The survey included open-ended and Likert questions about how well tutors were prepared to be virtual reading tutors, what worked well, what didn’t, and suggestions for program improvement. A copy of the tutor survey is included as Appendix C.

**Individual Interviews**

Semi-structured individual interviews were conducted with parents and tutors who had indicated in the Qualtrics survey a willingness to participate. The interview questions were designed to provide contextual qualitative data for deeper context on the perceived value and effectiveness of FoxesRead. Interview questions are provided as Appendix D.

**Data Instrument Summary**

A summary of data collection types and methods is included as Table 1.
Table 1

Participants and Data Collection

<table>
<thead>
<tr>
<th>Participants</th>
<th>Type of Data</th>
<th>Instrument</th>
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<tbody>
<tr>
<td>Participants</td>
<td>Pre and post-reading scores</td>
<td>Acadience Reading</td>
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<tr>
<td></td>
<td>(quantitative)</td>
<td></td>
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<tr>
<td>Parents</td>
<td>Survey (qualitative)</td>
<td>Online Qualtrics Survey</td>
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<td></td>
<td>Interview (qualitative)</td>
<td>Semi-Structured Interview</td>
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<tr>
<td>Tutors</td>
<td>Survey (qualitative)</td>
<td>Online Qualtrics Survey</td>
</tr>
<tr>
<td></td>
<td>Interview (qualitative)</td>
<td>Semi-Structured Interview</td>
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</table>

Data Collection

Of the 110 June FoxesRead participants, valid pre and posttest scores were documented for 68 students. Of the other 42 participants, some did not take one or the other test, had opted out of both, had transferred to the school after January 2020 and so pretest scores were unavailable, or had graduated from 6th grade in-between the two tests and so posttest scores were unavailable. Test scores from all other Franklin Discovery students not participating in FoxesRead were also collected in order to compare the impact of the FoxesRead intervention. The researchers had no direct contact with the students. Only test score data was collected from students.

Parent Data

The parents and guardians of all 110 participating students were invited to participate in the online Qualtrics surveys and an individual interview. The survey was sent to the 47 parents who collectively had 110 students in the June 2020 FoxesRead program (many parents had multiple children in the program). Of the 47 parents, 23 parents filled out the survey, taking an average of 8.66 minutes to complete, based on Qualtrics’ reporting. The Qualtrics survey
included a question asking if the parent was willing to participate in an interview or focus group. Two parent volunteers were subsequently interviewed with the semi-structured interview question set provided in Appendix B. Additionally, several parents responded to the survey invitation email with an email back that included comments about the program. Some of those email comments are included in the discussion as part of context.

**Tutor Data**

The tutor survey was sent to all 31 employees who had worked as tutors during June 2020 and was completed by 14 tutors, taking an average of 5.15 minutes to complete. Additionally, all tutors were invited to participate in an additional follow-up interview. Three tutors volunteered to participate in those interviews.

**Data Analysis**

The student data were analyzed using a quasi-research method model to discover the effect of the FoxesRead tutoring program on participating students. This effect was measured by comparing the change in Acadiane reading scores from January 2020 to September 2020 between those who participated in FoxesRead with those who did not. With Acadiane Reading, each sub-test has a numerical score that is later aggregated into one final composite score. Composite scores collected for this analysis ranged from 11 to the highest recorded score of 787.

For purposes of this research, we converted the composite score to a percent of grade level proficiency. This was necessary due to the differences in test scoring based on grade level. For instance, a kindergartener taking the test in January 2020 does not take the ORF subtest (oral reading fluency), but they would have taken it as a first grader for the August/September 2021 test. Because the composite score reflects the sum of the sub-tests, comparing raw composite scores across grades are not equivalent and would not be valid. Instead, each composite score
was converted to a percent of grade-level proficiency based on the benchmark tables provided by Acadiance Reading.

For each grade and testing period (beginning of year, middle of year, and end of year), Acadiance Reading has established the raw composite score equivalent to grade level proficiency (Dynamic Measurement Group, 2019). This score changes with each testing period since it is assumed that a student should progress during the school year. For instance, a first grader testing in January 2020 would need a score of 177 to be considered at grade level, but the same student would need a score of 202 in the August 2020 test to be at grade level. It goes up to 256 for the mid-school year January 2021 test and 287 for the test at the end of the year. In converting composite scores to a percent of grade level proficiency, scores ranged from 7% of grade level to 353%.

All Franklin Discovery students were first grouped by four pieces of demographic data: grade, gender, socioeconomic status (SES), and disability status. A FoxesRead student was then paired with a non-FoxesRead student with the same four pieces of demographic data and who had the next closest pretest score. In other words, hypothetically, a second grade male student with no disability and a low SES and a pretest Acadiance Reading score of 98% of grade level proficiency was paired to another male second grade student with no disability and low SES background with a similar pre-test score of 103% and not the student with a pretest score of 250%. Suitable pairs were found for all FoxesRead students with pretest scores within 21 percentage points of each other, although as will be addressed later, the students in the control group paired to the FoxesRead student generally started with a higher, rather than lower, Acadience Reading score.
To provide added depth of understanding to the numerical student data, qualitative data from the parent and tutor surveys and interviews were coded and evaluated to determine how satisfied each group was with the program and whether perceptions of the successes or failures of the program are congruent with the results of the student achievement outcomes. Likert scale questions were included to measure satisfaction for both parents and tutors. Standard statistical analysis was used to compare against the research questions regarding implementation and effectiveness of the program. Two parents participated in an additional in person interview. The tutor survey was sent to all 31 tutors with 14 participating in the survey. Additionally, three tutors volunteered to participate in an additional follow-up interview.

**Findings**

Pairing student test data led to 136 data points of 68 paired FoxRead/Non-FoxesRead students. The data was inputted into SPSS for analysis. SPSS was used to generate general descriptive statistics as well as to perform a split-plot analysis of variance, also known as a split-plot ANOVA. The ANOVA measures the means of an independent variable in a mixed factor group (e.g. FoxesRead or non-FoxesRead) with the other variable being a repeated measure variable (e.g. pre and posttest). The goal of this split-plot ANOVA was to determine whether the mean percent of grade level score for the FoxesRead treatment group was reliably different from the non-treatment group. ANOVA uses a partial eta squared for effect size. The suggested minimum sample size for a large effect size for a group mean comparison (\(\eta^2\)) requires \(N = 21\) in each group, which is met by our sample of 68 pairs. Richardson (2011) provides a guide for interpreting the effect size of the partial eta squared: Small = .01; medium = .06; and large = .14.

The paired Acadiance Reading percent of proficiency scores were used in the data analysis to perform the split-plot ANOVA and determine the difference in mean reading growth
between FoxesRead participants and non-participants. Results of the split-plot ANOVA revealed that there was a significant interaction effect between treatment group scores over pre and posttest $F(1, 136) = 59.913, p <.001$. The effect size, $\eta^2 = .309$, favoring the FoxesRead treatment group, is considered large at over twice the .14 large effect size definition provided by Richardson. These results are provided in Table 2 below:

Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p eta sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time x Treatment</td>
<td>136</td>
<td>1.66</td>
<td>59.913</td>
<td>.309</td>
</tr>
</tbody>
</table>

* $p < .001$.

Figure 1 provides a visual representation of the dramatic difference in mean scores between the two groups. Whereas the blue FoxesRead group line goes up over time, the red control group line goes down. A strong effect size in an ANOVA is represented when the two lines cross each other, such as in Figure 1.

**Figure 1**

*Treatment Effect Over Time*
Table 3 includes data on the mean for each group, pre and posttest, along with confidence intervals. This data reveals that the average FoxesRead student started the program reading at 93.3% of grade level, while the students in the control group started out higher, at 114% of grade level. Although the lower and upper bounds of the confidence intervals overlap, the ANOVA indicates the difference between the two means is statistically significant.

Table 3

*Treatment Over Time*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time</th>
<th>Mean</th>
<th>Std. Error</th>
<th>95% Confidence Interval</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>FoxesRead</td>
<td>1</td>
<td>.933</td>
<td>.062</td>
<td>.810</td>
<td>1.056</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.117</td>
<td>.058</td>
<td>1.002</td>
<td>1.232</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>1</td>
<td>1.149</td>
<td>.062</td>
<td>1.026</td>
<td>1.272</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1.021</td>
<td>.058</td>
<td>.906</td>
<td>1.136</td>
<td></td>
</tr>
</tbody>
</table>

Of the 68 studied FoxesRead participants, 54 improved their reading abilities during the study period as a percent of grade level proficiency compared to 16 of the paired non-participants improving their reading scores over the same period, that is 79% to 23.5% respectively. Forty-two of the 68 FoxesRead students had double-digit gains of a score increase of 10% or more, whereas only 9 of the control group students improved by double digits. The amount of improvement in 17 of the FoxesRead students was greater than the best improving control group student.

Thirty-six of the 68 FoxesRead students, or 53% percent of the treatment group, tested at reading below grade level during the initial pretest in January 2020, compared with 44% (29 of
of the control group testing below grade level. From Table 3 we can see that the FoxesRead students improved from an average of reading at 93% of grade level to 112% of grade level at posttest in September 2020, an improvement of 20.4%. The non-FoxesRead control group students started off higher, at 115% of grade level and dropped to 103% of grade level by the time of posttest, or a drop of 10.4%. This amounts to an overall difference in change in mean score between the two groups of 30%.

The scatter plot included as Graph 2 shows these differences visually. The squares on this graph represent the percent of improvement against grade-level benchmarks in the FoxesRead students between pretest and posttest. The circles represent the difference in scores for the control group student. With more squares showing higher than circles, the graph is a visual account of the higher level of improvement for the FoxesRead group. The scatter plot is presented in two versions. Figure 2 includes all data. Figure 3 is the same data but with one outlier from the FoxesRead group removed. One FoxesRead student had a 608% jump in improvement towards grade-level benchmark. The next closest student had a 254% improvement. The majority of students of students in both the treatment and control groups were below 150%. In order to better visualize the scatter plot results by increasing the y-axis scale, the 608% student is removed from Figure 3.
Figure 2

*Scatter Plot of Showing Change Between Pre and Posttest, All Data*

![Treatment Changes over Time](chart)

Figure 3

*Scatter Plot of the Data With One Outlier Removed*

![Treatment Changes over Time](chart)
The 10.4% drop measured in the control group is in line with the drops seen across the state of Utah. Statewide data from the same test, test period, and grade-levels, shows an average drop in Acadiance Reading scores from January 2020 to September 2020 of 14% for students in grades kindergarten to third (J. Price, internal access to state Acadiance Reading Utah dashboard, 2021).

Parent and Tutor Findings

Overall, parent satisfaction with the program ran high. Seventy-eight percent of the 23 parents responding to the survey reported being satisfied or very satisfied with the program, seventeen percent somewhat satisfied and four percent (one respondent) reporting neutral. No parents reported being dissatisfied, somewhat dissatisfied, or very dissatisfied with the program. On a 10-point scale asking parents if they would recommend FoxesRead to other parents, with 1 being “would not recommend at all” and 10 being “would highly recommend,” the average response was 9.1.

Parents also seemed to have a good understanding of the impact of the program on their students. Sixty-one percent of students reported that their students were “much better” in their reading abilities, seventeen percent reported “somewhat better” and twenty-two percent reported that their students had about the same reading level. This comports with actual results of 79% of students improving their reading abilities.

For all questions but one, parents choose the top Likert scale option a majority of the time when answering the various questions. The only question parents choose the second spot on the scale a majority of the time was in regards to how well they thought the tutor was trained. For this question, the top option was “extremely well trained,” which parents chose 13% of the time. The second option was “very well trained,” which parents chose 78% of the time with 9%
choosing the third option, “moderately trained.” Figure 4 includes data on these different questions. These graphs show parent perceptions of the FoxesRead program in four areas: how well the program met their goals for their student, their perceptions of their student’s improvement in reading, the ease of technology in using the program, and their perceptions of how well trained the tutors were. Each question was measured with a 5-point Likert scale.

**Figure 4**

*FoxesRead Parent Results*

![Pie charts showing parent perceptions.](image)

**Tutor Data**

Tutor perceptions, although different from that of parents, were also generally positive. The tutors ranked their effectiveness as a tutor high, with 12 of 14 saying they were extremely or
very effective, while two marked moderately effective. None of the tutors marked slightly or not effective. On a question of general satisfaction with the tutoring program, all 14 said they were extremely or moderately satisfied with their role as a FoxesRead tutor.

Tutors were asked about their satisfaction with the training they had received, and specifically if the 2-hour training session was enough. With a five-point Likert scale, most tutors, 75%, selected the middle option, that the 2-hour training “might or might not” be adequate for training future tutors. None of the tutors selected the option that the 2-hour training was “definitely” enough. They were also not as positive with the technology as were the parents. Fifty-seven percent reported that the technology was “somewhat difficult” to learn, which was the fourth out of five Likert scale options. However, none of the tutors chose “extremely difficult.” Eighty-three percent reported that when disregarding the technology piece, it was somewhat or extremely easy to be a tutor. The tutors were also asked to consider how much growth they saw in their student’s reading abilities on a 10-point scale with 1 being “no growth” and 10 being “significant growth.” The average response was 9.2 with all tutors answering 8 or above.

Discussion

The mainstream press often uses scintillating headlines when reporting on the status of education in America, including those on reading and how the research shows students who are not reading at grade level by the end of third grade are dramatically at risk for not graduating from high school or ending up in poverty or in prison. These reports have some basis in the research. A study by the Annie E. Casie Foundation found that 16% of children who are not reading proficiently in third grade do not graduate from high school on time, which is a rate four times higher than proficient readers (Hernandez, 2011). The general research does not claim that
students are somehow unable to learn to read after third grade, but that the problem lies more in that schools tend to stop directly teaching reading skills in third grade.

Many states have used this and similar research to justify various early literacy programs that focus on reading up to the third grade, including the state of Utah. Utah has set a benchmark goal that 60% of all third graders be reading at grade level. Various school funding streams are tied to this goal. The state of Utah sponsors numerous training meetings each year for educators on improving K-3 reading levels. In those meetings, the trainers use 3% as the target and definition of an effective program. They have indicated that schools and districts will spend millions of dollars to fund a new initiative and if a 3% improvement is measured, the program is considered a success. The Covid-19 pandemic unleashed a new level of concern for reading levels and other academic progress in terms of how much progress was lost during the shutdowns.

The administration and staff at Franklin Discovery were also concerned about the impact of Covid on its students’ reading levels. The school’s history is intertwined with the story of Bloom’s 2 sigma problem (1984), and the administration looked for solutions to the Covid-19 interruptions from the lens of Bloom by offering a tutoring intervention. The data shows that the tutoring had a positive impact on students and easily met the 3% threshold established by the state board as the target for a successful program.

A perfect comparison to Bloom’s 2 sigma results cannot be drawn since the measurement format of the study is different. In Bloom’s study (1984), groups of students were taught the same material and then given the same test on that material. Results were presented in terms of the students' overall test scores. In our study, we are comparing the growth of the student’s progress toward grade-level reading proficiency. Despite these differences in measurement types,
we are able to use study data to estimate the effectiveness of reading tutoring in the context of Bloom and calculate the sigma difference in growth between our treatment and control groups. Students in the FoxesRead group improved their reading level by a .749 sigma difference over students in the treatment group. To add context to this result from the literature, a 2013 meta-analysis of 41 summer reading programs from grades K-8 revealed an average .14 sigma effect. (Kim & Quinn, 2013). Although not a 2 sigma difference, the .749 sigma result for the FoxesRead program is worth further investigation.

The data revealed several interesting points in the context of the difficulties during the Covid-19 related shutdowns of 2020. First, the parents reported that the technology was easy to use. This is in contrast to the many reports of technology frustrations during school shut-downs. Second, the tutoring had an effect even though there were logistical limitations that resulted in minimal tutor training. The FoxesRead program provides evidence that although highly trained and experienced tutors are ideal, even a novice tutor can have a positive impact. Third, the tutoring was perceived as a positive experience by both parents and tutors during an otherwise stressful time. Finally, the data pointed to the benefit that the one-to-one relationship brings to tutoring. One parent reported, “The one-on-one help is so very effective compared to anything else. Both of my kids were part of the foxes read program and we thought it was great!” Another parent described how she had given up reading with her son because it had turned into a fight, but the FoxesRead tutor was able to develop a relationship and make reading a more positive experience. She reported that “FoxesRead did its job because now my son will read with me and enjoy it. It used to be such a fight. I couldn’t be happier that battle is over.”

This research was focused on comparing the growth in reading levels between our two groups of students. We did not examine other variables such as the impact of age, gender,
disability, or socioeconomic status. Although these variables were used to pair the FoxesRead students with a similar student for the control group, the impact of the variable itself was not a part of this research. Future research is needed to further understand the impact of other potential confounding variables.

Although we were concerned with the effectiveness of a reading program during a school closure situation where students needed to participate from a computer at home, another opportunity for study is how FoxesRead can be brought into the classroom during a regular school year and its potential impact as a regular program. In addition to the financial issues Bloom (1984) described, bringing enough people into a school building to provide one-on-one tutoring for all students presents many logistical problems, from where to physically put all the tutors, to where to put all the books, to even if there are enough parking spots for all tutors.

Because of the positive experience with FoxesRead during the summer of 2020 and subsequently with school-at-home students during the 2020-21 school-year, the administrators at Franklin Discovery decided to add FoxesRead for all in-person second and third grade students during the 2021-22 school year. The students would still login to Zoom and tutor with a remote tutor, but they would login while at school. Such a program allowed Franklin Discovery to hire tutors at a lower rate than a typical employee. Since tutors do not have to commute and have other benefits of remote work, they can be recruited at a lower hourly cost. Bloom (1984) described the problem with tutors as one of cost, and the remote workforce partly addresses those financial issues in a way not available in Bloom’s time. Along with the cost savings of remote tutors, having them be remote solved a variety of physical space issues. During August 2021, the school hired 15 remote tutors and began providing daily one-on-one tutoring for all 170 second and third graders.
In response to a notice to parents about the in-school tutoring, one parent wrote, “my son is in the 3rd grade now. He participated in foxes read during the summer of 2020. I was impressed that he was engaged and motivated because of this program. He has always loved being read to, but he still struggles with the confidence and perseverance to try on his own. However, with this program he was excited to practice and meet with his tutor regularly. He has also already told me about starting again this year and again I see his excitement about reading. I am hopeful that this will be the year where reading “clicks” for him just as it did with his older brother and I think this program can be the catalyst for that progress.” The impact of in-school tutoring is another area for future study.

Bloom’s (1984) research suggests that if given appropriate opportunities with a one-on-one tutor, almost every student can achieve at high levels. The results of the current study demonstrate virtual tutoring in the domain of reading can be effective in helping improve early literacy skills among students. Ultimately, we believe that because reading is the foundational skills for future success in academics, the promising findings of the FoxesRead intervention point towards a justification for its further use and study.
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APPENDIX A

Institutional Review Board Approval Letter

Memorandum

To: Heather Leary, Ph.D.
Department: BYU - EDUC - Instructional Psychology & Technology
From: Sandee Aina, MPA, HRPP Associate Director
      Wayne Larsen, MAcc, IRB Administrator
Date: September 28, 2020
IRB#: IRB2020-302
Title: Charter schools and innovation: A case study on developing a virtual summer reading program for K-6 students following school shutdown for COVID-19.

Brigham Young University’s IRB has approved the research study referenced in the subject heading as exempt level, categories 1 and 2. This study does not require an annual continuing review. Each year near the anniversary of the approval date, you will receive an email reminding you of your obligations as a researcher and to check on the status of the study. You will receive this email each year until you close the study.

The study is approved as of 09/28/2020. Please reference your assigned IRB identification number in any correspondence with the IRB.

Continued approval is conditional upon your compliance with the following requirements:

1. A copy of the approved informed consent statement can be found in IRIS. No other consent statement should be used. Each research subject must be provided with a copy or a way to access the consent statement.
2. Any modifications to the approved protocol must be submitted, reviewed, and approved by the IRB before modifications are incorporated in the study.
3. All recruiting tools must be submitted and approved by the IRB prior to use.
4. Instructions to access approved documents, submit modifications, report adverse events, can be found on the IRB website, IRIS guide: http://orca.byu.edu/irb/IRIS/story_html5.html
5. All non-serious unanticipated problems should be reported to the IRB within 2 weeks of the first awareness of the problem by the PI. Prompt reporting is important, as unanticipated problems often require some modification of study procedures, protocols, and/or informed consent processes. Such modifications require the review and approval of the IRB. Please refer to the IRB website for more information.
APPENDIX B

Parent Survey

FoxesRead - Qualtrics Parent Survey

Instructions:
Thank you for participating in this FoxesRead Tutor survey!

The purpose of this survey is to collect feedback on your experience as a tutor with the FoxesRead program. Franklin Discovery Academy has permitted this survey by researchers Dr. Heather Leary, assistant professor in Instructional Psychology and Technology (IP&T) department, and IP&T PhD candidate Jennifer Price, in order to better understand your satisfaction with the FoxesRead program. IRB approval has been obtained from BYU.

Please read this consent document carefully before you decide to participate in this study. Please contact the researcher Jennifer Price at jlb@byu.edu to answer any questions before you sign this form.

Study title: A case study on developing a virtual summer reading program for K-6 students following school shutdown for COVID-19.

Purpose of study: Evaluate the satisfaction and effectiveness of the Franklin Discovery FoxesRead program during summer 2020.

Potential risks of participating: The risks are considered minimal. The risks are not more than everyday life. Potential risks may include being uncomfortable answering questions.

Time commitment: It is estimated that this survey will take 5 to 10 minutes of your time.

Potential benefits of participating: There are no direct benefits to participants for participating. However, the researchers hope to learn if and/or how students benefited from the FoxesRead program and how the program could be improved.

Compensation: No compensation is offered for participating.

Confidentiality: Data will only be made available to Principal Investigator and immediate study personnel. Data collection will be confidential and de-identified (collected with identifiers, but identifiers removed). The de-identified data will be stored for seven years in the researcher's password-protected BYU Box account for future use.

Voluntary participation: Your participation in this study is completely voluntary. There is no penalty for not participating. Your child's standing at Franklin Discovery Academy is not contingent upon participation in this research. You may also refuse to answer any of the questions we ask you.

Right to withdraw from the study: You have a right to withdraw from the study at any time without consequence.

Questions about Participant Rights: For questions about participant rights, please contact the BYU Human Research Protection Program at 801-422-1461 or by email at irb@byu.edu

Who to contact about your participation in the study:
  Dr. Heather Leary
  McKay Building
Agreement: I have read the procedure described above. I voluntarily agree to the procedure and I have received a copy of this description.

1. Please type your name:

2. How many students did you have participating in the FoxesRead program during June 2020?  
   o0  o1  o2  o3  o4

3. Did your student(s) also participate in the April/May 2020 Foxes Read program?  
   oYes   oNo

4. What was your primary reason for having your student(s) participate in FoxesRead?

5. What was your primary goal for having your student(s) participate in FoxesRead?

6. How well did the FoxesRead program meet that goal?  
   (If you had multiple children in the program, please answer the question as it relates to your youngest participating child)  
   oExtremely well   oVery well   oModerately well   oSlightly well   oNot well at all

7. Thinking of your student's reading abilities on June 1 and comparing to their reading abilities on June 30, please describe the level of improvement to their reading abilities over the course of FoxesRead:  
   (If you had multiple children in the program, please answer the question as it relates to your youngest participating child)  
   oMuch better   oSomewhat better   oAbout the same   oSomewhat worse   oMuch worse

8. Thinking of the technology used in the program (Zoom and Reading A-Z), how easy or difficult was it to participate in the FoxesRead program?  
   oExtremely easy   oModerately easy   oSlightly easy   oNeither easy nor difficult   oSlightly difficult

9. Thinking from the perspective of a virtual tutoring program, do you have any suggestions on how the technology can be improved and/or changed to make participation easier and/or more meaningful for your student?

10. Did your student use the KidsA-Z website or app to do additional reading outside of FoxesRead?  
    oYes   oNot Sure   oNo

11. Please describe your perception of the training level of your student's tutor:  
    (If you had multiple children in the program, please answer the question as it relates to your youngest participating child)
12. Please describe the ways in which your student's tutor was inadequately prepared to tutor in reading:

13. How well did your student's tutor keep you informed of progress in the FoxesRead program?
   - Extremely well
   - Very well
   - Moderately well
   - Slightly well
   - Not well at all

14. Overall, how satisfied or dissatisfied were you with the FoxesRead program?
   - Very Dissatisfied
   - Dissatisfied
   - Somewhat Dissatisfied
   - Neutral
   - Somewhat Satisfied
   - Satisfied
   - Very Satisfied

15. How likely would you be to have your student(s) participate in the FoxesRead program again?
   - Very Unlikely
   - Unlikely
   - Somewhat Unlikely
   - Undecided
   - Somewhat Likely

16. How likely are you to recommend FoxesRead to other parents?
   - 00
   - 01
   - 02
   - 03
   - 04
   - 05
   - 06
   - 07
   - 08
   - 09
   - 10

17. Would you be willing to participate in a one-hour focus group related to FoxesRead, your experience with the program, and suggestions for improvement? The focus group will be held at Franklin Discovery Academy.
   - Yes
   - Maybe
   - No
APPENDIX C

Tutor Survey

FoxesRead - Tutor Survey

Thank you for participating in this FoxesRead Tutor survey!

The purpose of this survey is to collect feedback on your experience as a tutor with the FoxesRead program. Franklin Discovery Academy has permitted this survey by researchers Dr. Heather Leary, assistant professor in Instructional Psychology and Technology (IP&T) department, and IP&T PhD candidate Jennifer Price, in order to better understand your satisfaction with the FoxesRead program. IRB approval has been obtained from BYU.

Please read this consent document carefully before you decide to participate in this study. Please contact the researcher Jennifer Price at jlb@byu.edu to answer any questions before you sign this form.

Study title: A case study on developing a virtual summer reading program for K-6 students following school shutdown for COVID-19.

Purpose of study: Evaluate the satisfaction and effectiveness of the Franklin Discovery FoxesRead program during summer 2020.

Potential risks of participating: The risks are considering minimal. The risks are not more than everyday life. Potential risks may include being uncomfortable answering questions.

Time commitment: It is estimated that this survey will take 5 to 10 minutes of your time.

Potential benefits of participating: There are no direct benefits to participants for participating. However, the researchers hope to learn if and/or how students benefited from the FoxesRead program and how the program could be improved.

Compensation: No compensation is offered for participating.

Confidentiality: Data will only be made available to Principal Investigator and immediate study personnel. Data collection will be confidential and de-identified (collected with identifiers, but identifiers removed). The de-identified data will be stored for seven years in the researcher's password-protected BYU Box account for future use.

Voluntary participation: Your participation in this study is completely voluntary. There is no penalty for not participating. Your employment standing at Franklin Discovery Academy is not contingent upon participation in this research. You may also refuse to answer any of the questions we ask you.

Right to withdraw from the study: You have a right to withdraw from the study at any time without consequence.
Questions about Participant Rights: For questions about participant rights, please contact the BYU Human Research Protection Program at 801-422-1461 or by email at irb@byu.edu

Who to contact about your participation in the study:

Dr. Heather Leary
McKay Building
BYU, Provo UT. 84602
email: heather.leary@byu.edu
phone: 801-422-2765

Agreement: I have read the procedure described above. I voluntarily agree to the procedure and I have received a copy of this description.

1. Please type your name here:

2. How comfortable did you feel tutoring in a virtual setting?
   - O Extremely comfortable
   - O Somewhat comfortable
   - O Neither comfortable nor uncomfortable
   - O Somewhat uncomfortable
   - O Extremely uncomfortable

3. How difficult was it to learn the technology piece of FoxesRead (Zoom and Reading A-Z)?
   - O Extremely easy
   - O Somewhat easy
   - O Neither easy nor difficult
   - O Somewhat difficult
   - O Extremely difficult

4. How difficult was it to learn how to tutor reading?
   - O Extremely easy
   - O Somewhat easy
   - O Neither easy nor difficult
   - O Somewhat difficult
   - O Extremely difficult

5. Acknowledging the unique circumstances that led to FoxesRead (a sudden school shutdown because of Coronavirus), do you feel that future tutors can be trained and ready to effectively tutor students with one two-hour long training session?
   - O Definitely yes, adequate FoxesRead training could happen in two-hours or less
   - O Probably yes
   - O Might or might not
   - O Probably not
   - O Definitely not, significantly more training and/or experience is needed to be an effective tutor

6. Please describe training topics you think need to be covered with new FoxesRead tutors: For everyone one hour of actual tutoring with a student, how much time is needed to prepare/follow-up for that hour?
   - O 9 minutes or less
   - O 10-14 minutes
   - O 15-24 minutes
   - O 25-34 minutes
   - O 35-44 minutes
   - O 45-60 minutes
7. In general terms thinking all of your students together, please indicate how much reading growth you felt you observed with your students during FoxesRead June 2020. Please consider growth on a scale of 1 to 10 with 1 being no growth and 10 being significant growth.
   o1-no growth o2 o3 o4 o5 o6 o7 o8 o9 o10-significant growth

8. Please describe your best FoxesRead moment:
   How effective do you feel you were as a reading tutor in an online setting?
   O Extremely effective O Very effective O Moderately effective
   O Slightly effective O Not effective at all

9. How effective do you feel you were in general terms as a reading tutor, disregarding any tech issues.
   O Extremely effective O Very effective O Moderately effective O Slightly effective O Not effective at all

10. If you could make one change to the FoxesRead program, what would it be?
    In general, how satisfied or dissatisfied were you in your role as a tutor with FoxesRead?
    O Extremely satisfied O Moderately satisfied O Slightly satisfied
    O Neither satisfied nor dissatisfied O Slightly dissatisfied

11. Please describe the reason(s) for marking dissatisfied:
Invitation email:
Purpose: Researchers at Brigham Young University are conducting a program assessment under the supervision of Dr. Heather Leary. You are invited to participate. The purpose of the study is to examine the effectiveness of the June 2020 FoxesRead program at Franklin Discovery Academy. Specifically, we want to understand the impact of the program on your student’s reading abilities. We will use this information to evaluate effectiveness of the program and make recommendations for continuation of the program and/or improvement.

Procedures: If you participate in this study, you will be in a group of approximately five to seven parents. There will be a facilitator who will ask questions and facilitate the discussion, and one note-taker to write down the ideas expressed within the group. If you volunteer to participate in this focus group, you will be asked some questions relating to your experience with the FoxesRead program. These questions will help us to better understand the impact and effectiveness of FoxesRead.

Your participation is voluntary. You may withdraw from this study at any time without penalty.

Benefits and Risks: Your participation may benefit you, Franklin Discovery Academy, and other Brigham Young University students by helping to improve the FoxesRead program. No risk greater than those experienced in ordinary conversation are anticipated. Everyone will be asked to respect the privacy of the other group members. All participants will be asked not to disclose anything said within the context of the discussion, but it is important to understand that other people in the group with you may not keep all information private and confidential.

Confidentiality: Anonymous data from this study will be analyzed by the research team from Brigham Young University led by Dr. Heather Leary and may be reported to Franklin Discovery Academy administrators. No individual participant will be identified or linked to the results. Study records, including this consent form signed by you, may be inspected by the administrators. The results of this study may be presented to Franklin Discovery Academy representatives; however, your identity will not be disclosed. All information obtained in this study will be kept strictly confidential. All materials will be stored in a secure location within the IP&T department at Brigham Young University and access to files will be restricted to the research staff.

Consent: By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this focus group.

Participant's signature: ______________________________
Printed name: ______________________________
Date: ______________________________

If you have any questions or concerns about this study, please contact Heather Leary at heather.leary@byu.edu
Interview Template
Welcome and thank you for being here today. The purpose of this gathering is to get your feedback about the June 2020 FoxesRead program at Franklin Discovery Academy. Specifically, we want to understand what worked well and didn’t work for you and your student(s), if you found the program effective, and your suggestions for improvement.

Once we understand what works, we hope to provide Franklin Discovery with information on how effective the program was implemented, suggestions for improving it, and how to better train the tutors. As a parent with a student in the program, you have a better understanding of what works than we do. That is why we are talking with you.

Let me introduce myself. I am ____________ and I will be the moderator in today’s discussion. The format we are using is a focus group. A focus group is a conversation that focuses on specific questions in a safe and confidential environment. I will guide the conversation by asking questions that each of you can respond to. There are no right or wrong answers to these questions. Just be honest. If you wish, you can also respond to each other’s comments, like you would in an ordinary conversation. It is my job to make sure that everyone here gets to participate and that we stay on track. ________ is here to record and summarize your comments.

Before we get started, I want to let you know two things. First, the information we learn today will be compiled into a final report. That report will include a summary of your comments and some recommendations. It will be shared with the Administrators at Franklin Discovery Academy, the providers of FoxesRead, and the research team at Brigham Young University for student research purposes. Secondly, you do not have to answer any questions that you do not feel comfortable with. This focus group today is anonymous and confidential. “Anonymous” means that we will not be using your names and you will not be identified as an individual in our report of this project. “Confidential” means that what we say in this room should not be repeated outside of this room. Obviously, I cannot control what you do when you leave, but I ask each of you to respect each other’s privacy and not tell anyone what was said by others here today. Although we hope everyone here honors this confidentiality, please remember that what you say here today could be repeated by another focus group member. So please, do not say anything that you absolutely need to keep private.

As you can see, we will be recording this focus group. The recording will only be used to make sure our notes are correct and will not be heard by anyone outside of this project.

Let’s begin with introductions.

Q #1. Please share with us your name and something you love to do in your free time.

Q #2: Think back to when you first heard about FoxesRead. Why did you first sign up your student(s) into the program?

Probing Question (if necessary): Did anyone else have similar reasons? Was the program able to meet those expectations?

Q #3: Please tell us about the student(s) you have enrolled in the FoxesRead program?

Q #4: Please describe what it was like to get your student(s) to participate in the program. Were they cooperative? Excited to read? Fighting it?

Q #5: On a scale of 1-10, where 10 is Wow! And 1 is Stinko, rate this program for you and your student(s).
Q #6: What did you not like about the FoxesRead program?
Q #7: What did you like about the FoxesRead program?
Q #8: If you could change one thing about the FoxesRead program, what would it be?
Q #9: How helpful do you feel the program was for your student(s)?
Q #10: How much growth did you see in your student(s) from their participation in Foxes Read?

Probing Question (if necessary): Did anyone else have similar experiences with their children?
Ending Question: What advice would you give to Franklin Discovery on training the tutors?

I see our time is up. Thank you so much for sharing this useful information with us.
DISsertation Conclusion

This dissertation provides a framework for understanding innovation in charter schools. We provided three articles that, when woven together, tell the collective story of the types of innovations most common in charter schools, what leads to successful implementation, and how to avoid failure. The articles are tied together with the common thread of Bloom’s 2 sigma problem and the challenge he issued nearly four decades ago: can anyone figure out how to produce learning outcomes that are as good as with tutoring, but at a more reasonable cost (Bloom, 1984). Bloom asserted that the solution could be found in any type of educational innovation. Our findings covered a broad array of innovations, sometimes producing a positive outcome and sometimes not.

In the literature review, we compared the effect of three different charter school innovations. While none of these innovations produced a 2 sigma effect, we still encountered many successful programs having a positive effect. The literature reveals that for innovations to be successful, they need to be well-planned, include proper training, and carried out by the right people. In the second article, we reviewed how the founders of a new charter school, Franklin Discovery Academy, addressed Bloom’s 2 sigma problem by using his challenge as a framework for their new school. In this design case, we reviewed two key design decisions made by the founders as they attempted to create a school with high doses of tutoring. We examined the pitfalls of start-up, the importance of quick iteration, and the key role of employee fit.

For the third article, we analyzed the effect of a new and innovative program offered by Franklin Discovery in response to the Covid-19 pandemic. Although the .7 sigma effect we document in this article falls short of Bloom’s 2 sigma difference, the positive effect is quite significant and worthy of further study. In this article we review the implementation, in which
again quick iteration proved essential, and data from students, parents, and tutors to understand the impact of the program on each group.

There is still much work to be done to truly solve Bloom’s 2 sigma problem. However, the findings of this study show that while a 2 sigma difference is a noble goal, it is not generally the most realistic goal in an educational setting. Sigma differences at a much lower level can still represent very successful programs with positive impacts to stakeholders. Based on our findings, challenges in implementing innovative practices can be managed effectively with the right people and the ability to iterate.
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