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Commercially Available or Home-grown: A Cost-effectiveness Analysis of K-12 Online Courses

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COMMERCIAL AVAILABLE OR HOME-GROWN: A COST-EFFECTIVENESS ANALYSIS OF K-12 ONLINE COURSES

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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ABSTRACT

COMMERCIALLY AVAILABLE OR HOME-GROWN: A COST-EFFECTIVENESS ANALYSIS OF K-12 ONLINE COURSES

By Susan Proffitt, Ph.D.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Major Director: Charol Shakeshaft
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Online learning in K-12 education is becoming a familiar option for students. By the end of 2011, all 50 states and the District of Columbia offered some form of online learning as an option for some students (Watson, Murin, Vashaw, Gemin, & Rapp, 2011). Online courses are appealing to students for a variety of reasons. The five most common reasons schools are currently offering online courses are for: meeting the needs of specific groups of students, offering courses not otherwise available, offering advanced placement or college level courses, permitting students who failed a course to take it again, and reducing scheduling conflicts for students (Picciano & Seaman, 2010, p. 9). Schools often implement online programs, choosing from a variety of options, without the research necessary to guide these decisions.

The purpose of this research was to conduct a cost-effectiveness analysis of two online learning programs, commercially acquired and teacher-developed, used in a school division. The goal was to establish which program was a better choice with consideration to both cost and
effectiveness. I used Levin and McEwan’s (2001) cost-effectiveness analysis to find (a) the cost per unique enrollment; (b) the effectiveness, measured by courses passed and Virginia Standards of Learning tests passed; and (c) the cost-effectiveness ratio for both of the online programs.

The ingredients method, suggested by Levin and McEwan (2001), was implemented with the use of cost worksheets to gather and itemize the costs associated with the each program. Only three courses were offered in both programs and used for comparison. Effectiveness data were based on students’ grade at the end of the online course and the end of course SOL test if applicable. Each effectiveness measure was used together with the cost total to calculate a cost-effectiveness ratio (CER) for each of the online learning programs.

The cost-effectiveness analysis for passing the class revealed no difference between the two programs. The stalemate highlights the important findings of the research as the details in spending and methods of implementation of each program. The school system of interest benefits from the detailed itemization of costs, which identified areas for modification to the programs. The implication for schools looking to initiate an online program is the well-informed leader having detailed information on the costs involved and options for design. The difference in the cost-effectiveness ratio for the measurement of passing the SOL test was dramatically different. The commercially available program’s cost-effectiveness ratio was double that for the teacher-developed program. The implications for the school division in the research were to evaluate the alignment of a commercial program to state standards and to examine the ability of the online program to meet the goals of the school.
CHAPTER 1. INTRODUCTION TO THE STUDY

Introduction

The end of the 20th century witnessed a surge in the implementation of technology in the K-12 setting. Beginning with the use of graphing calculators and videos, then moving on to computers and LCD projectors, K-12 educators placed emphasis on the necessity of increasing the use of technology to better prepare students for the 21st century. Now, with the first decade of the 21st century behind us, we can note that the progress has been astounding and has not ceased to continue. Where 20 years ago a goal for educators may have been to have a computer in every classroom or a computer per every 10 students, educators now have already seen 1 to 1 laptop initiatives in public secondary schools and requirements to purchase laptops in private schools. Online learning began with students in rural areas taking classes via video during the school day; but now, this evolution has advanced with schools offering or even providing their students with access to online courses that can be taken anytime or anywhere.

The Rise in Online Learning

The International Association of K-12 Online Learning (iNACOL, 2011) defines online learning as “education in which instruction and content are delivered primarily over the Internet” (p. 7). Online learning can be fully online or blended, where a fully online course is one which most or all of the content is delivered using the Internet and usually has no face-to-face interaction. Online learning as an option for all high school students is a reality. According to Picciano and Seaman (2009), in the Sloan Consortium report, K-12 Online Learning: A 2008
Follow-up of the Survey of U.S. School District Administrators, more than 1,000,000 American K-12 students were enrolled in at least one online course during the 2007-2008 academic year. This is up from the estimated 700,000 in the first report 2 years earlier. These numbers are probably even higher since this report, the most recent available, is 4 years old. In addition, Queen and Lewis (2011), in a report for the U.S. Department of Education (USDOE), National Center for Education Statistics (NCES) estimate more than 1,800,000 enrollments in online courses, with almost three-quarters coming from high schools. Lastly, according to Watson, Murin, Vashaw, Gemin, and Rapp (2013), in a report from the Evergreen Education Group, 29 states, and Washington, DC, currently have state run full-time online schools.

The path has been paved with the proliferation of colleges and universities offering online courses and the creation of virtual schools initiated by K-12 state departments of education. The question is not whether, but which of the available online course programs to offer.

**Funding in Education**

Currently, school systems across the nation are faced with budget shortfalls that seem unlikely to dissipate in the near future. The economic crisis of 2008 greatly affected K-12 education at the federal and state level as well as with the local school systems and has not yet subsided. These cuts are confounded by increased costs associated with education. The National Education Association (2013) has estimated that there are 5.8 million more students in American K-12 schools today than in 2004 and costs have gone up by 36%. Yet, with the current proposed federal budget cuts for 2013, the funding would be below the level it was in 2004. At the state level, Virginia’s per-pupil expenditure has increased from $8,481 in 2004 to $10,095 in 2009 and localities are facing budget deficits and looking for ways to cut spending. Educational programs
and reform are not resistant to cost, yet cost analysis research is not common in education. Levin
discusses a possible reason for a lack of quality cost-effectiveness analysis in education is that
“educational evaluators were preoccupied with educational effectiveness, regardless of cost
implications” (Levin, 2001, p. 59).

**Academic Standards**

Additionally, and equally important as cost, is how effectively each online course option
is at meeting the academic and achievement goals of the school districts. These objectives vary
by school district, but might include passing a required course for graduation, passing an
advanced placement (AP) course and the ensuing exam, gaining elective credit, or gaining
college credit. Similar to cost, school leaders are accountable for making decisions based on
effectiveness that best meet the needs of their school system.

**Statement of the Problem**

Educational reforms, which may include changes in instructional programs, class size
reductions, new teacher training, or computer integration to name a few, are multifaceted and
decisions to implement these programs are evaluated thoroughly. There is no exception for the
implementation of online learning in a school system. There are numerous factors influencing
the decision-making process for school leaders when choosing between the available options.
The cost of providing a program is an element of the decision too significant and consequential
to be ignored. The cost for offering online courses is often difficult to calculate and there are
few appropriate models to follow. For instance, using the expenditures colleges’ assess would be
inappropriate because of comparatively different budgetary resources and the ability of colleges
to charge tuition. Care must also be taken when approximating the financial responsibility based
on the experiences of another school system. There are disparities among schools’ existing
technology and available resources that create numerous starting points and allow for great variability in the budget necessary to implement online learning programs. It is the responsibility of school leaders to thoroughly examine the costs associated with each online course option they are considering.

Additionally, and equally important as cost, is how effectively each online course option meets the academic and achievement goals of the school districts. These objectives vary by school district, but might include passing a required course for graduation, passing an AP course and the ensuing exam, gaining elective credit, or gaining college credit. In a similar manner to cost, the effectiveness of an online program is a contributing factor to the decision-making process but can often be achieved more easily than cost provided there are well defined outcomes. School leaders are accountable for making the best decision based on effectiveness that best meet the needs of their school system. Research comparing various online programs for cost and effectiveness may add to the existing research pertaining to online learning and aid in the decision-making process.

Significance of the Study

The availability of online courses at the secondary level is not new to education, but its continued growth is expected (Picciano & Seaman, 2009). The current emphasis on a technology-rich 21st century education supports this progress. Not if, but when, schools are faced with choosing the best option to make available to their students, tough decisions are certain. “State and local education systems face the dual challenges of improving outcomes while confronting budgetary declines” (Bakia, Shear, Toyama, & Lasseter, 2012, p. 1). Bakia et al. (2012) identify the challenge that school systems are faced with when implementing online learning courses to be “reducing costs without sacrificing quality” (p. 1). Battaglino, Haldeman,
and Laurans (2012) argue that, “Ultimately, new technology-rich education models will need to be evaluated based on their productivity, that is, the results that they produce relative to the required investment” (p. 1). The authors go on to state that, “Unfortunately, within the nascent field of online learning, this information simply isn’t yet available” (p. 1). This research analyzed information on the cost effectiveness of online learning, an area where information is limited, yet growth and implementation are on the rise.

This study provides one example of a comparison between two different online learning options while attempting to consider both cost and effectiveness of the two programs. It identified the necessary components of the implementation of online learning and their costs for the program to function successfully. The research revealed the most beneficial option for the school division examined. In addition, this study may provide other school systems with the information necessary to assist leaders in making an informed and appropriate decision based on both effectiveness and cost when choosing between various online course options.

**Overview of the Study**

This research analyzed two of the available options that school systems might consider when choosing an online learning program for their students. It used the work of Levin and McEwan (2001) and implemented a cost-effectiveness analysis of both a teacher-developed online learning program and a commercially available online learning program from Edgenuity™ (formerly e2020, Inc.). The associated costs, end of course grades, and end of course test scores for both the teacher-developed online program and Edgenuity™ online program were analyzed. A cost-effectiveness ratio was calculated for each program, and then the two were compared. This information can be used to guide school systems in making an
informed decision on the options based on both cost and effectiveness when choosing an online learning program.

**Rationale for the Study**

The rationale for this study stems from the rise in use of online learning programs. Researchers at the Sloan Consortium found that in 2005 student enrollment in online courses at the K-12 level was approximately 700,000, and by 2010 this number had reached over 1,000,000 (Picciano & Seaman, 2009). The 2010 Metropolitan Educational Research Consortium research on the use of online learning in Virginia K-12 schools stated that “while documenting actual enrollment numbers is nearly impossible, there are clear indicators that the number of students in Virginia taking online and/or blended learning courses is rising and will continue to rise” (Becker, Senechal, & Shakeshaft, 2013, p. 25). The reality is that schools are offering or will be offering online programs to students either by choice or because, in some states, it is required. The proliferation of online learning in the K-12 setting raises questions and requires difficult decisions by school decision makers faced with the many options available to school systems. More specifically, how do school systems decision makers make the best choice of online learning programs when considering the ongoing budget issues at the federal, state, and local levels and the high standards of learning imposed on local school systems from both the state and The No Child Left Behind Act of 2001.

**Overview of the Literature**

There are four main areas examined in the literature review that follows. They are: the current status of online learning; the effectiveness of online learning; the cost of online learning; and online learning in Virginia. This study has been influenced by the increased growth,
availability, popularity, and even requirement of online learning. The topics described below will highlight the need for this research.

**Current Status of Online Learning**

Online learning can be defined as learning that takes place partially or entirely over the Internet. A fully online course is when at least 80% of the course content is delivered online. It was estimated that more than 7.1 million higher education students took an online course during the fall of 2013 (Allen & Seaman, 2014). This equates 33.5% of all higher education students taking at least one online course. This trend may influence the growth in online courses at the K-12 level because secondary schools try to better prepare students for the postsecondary level. At the K-12 level, a report published by the iNACOL estimates that 1.5 million students are enrolled in one or more online courses (Wicks, 2010). The U.S. Department of Education, National Center for Education Statistics estimates the number of courses to be more than 1.8 million (Queen & Lewis, 2011).

Online learning is offered in a variety of ways. Many students at the K-12 level have the option of taking an online course through a local school district provided teacher-developed online course, another school district that provides across district online courses, an approved for-profit online vendor, college and university sponsored online courses, or even their own state virtual school. Evergreen Consulting reports that 39 states now have state virtual schools or state sponsored online learning initiatives (Watson, Murin, Vashaw, Gemin, & Rapp, 2010). More specifically, in their most recent report of online learning for the 2013-2014 school year, 25 states have state virtual schools, and 29 states and Washington DC have full-time online schools (Watson, et al., 2013). In addition, by the end of 2011, all 50 states and the District of Columbia had a form of online learning offering for at least some students (Watson, Murin, Vashaw,
Gemin, & Rapp, 2011). Lastly of note, Watson et al. (2011) also state that, single district online programs “are the largest and fastest-growing segment of online and blended learning, as they have been for several years” (p. 17). They exist or are being planned at 50% of all school districts. Picciano and Seaman (2009) offer another view of where this growing educational program is heading. In a survey of K-12 school superintendents in the United States, results suggest that the approximately 15% of school districts with students not enrolled in online courses, plan to offer them over the next 3 years.

Online courses are appealing to students across America for a variety of reasons. The four most common reasons schools are currently offering online courses are for: meeting the needs of specific groups of students; offering courses not otherwise available; offering AP or college level courses; permitting students who failed a course to take it again; and reducing scheduling conflicts for students (Picciano & Seaman, 2010). Online courses are available through local districts, state virtual schools, college or universities, and independent for-profit vendors. Research evaluating these options at the K-12 level is limited and decisions for choosing among these options are often made without sufficient evidence to support the choice. Bakia et al. (2012) state that, “Educational stakeholders at every level need information regarding effective instructional strategies and methods for improving educational productivity” (p. vii). Furthermore, the authors emphasize a need for additional research from quality studies that follow rigorous methods and accurately represent costs while using acceptable measures of students’ academic achievement.

**Effectiveness of Online Learning**

The evaluation of the effectiveness of online learning compared to traditional face-to-face learning continues to be necessary. “Because online learning is serving increasing numbers of
secondary students, it is essential to understand whether, when and how particular implementations of online learning are equally or more productive than other forms of instruction” (Bakia et al., 2012). The current trend and continued increase of enrollment in online courses relies on the results of a limited body of research at the K-12 level. Much of the rigorous research available is at the postsecondary level, leaving the need for continued examination in the K-12 arena.

One meta-analysis focusing on K-12 education by Cavanaugh, Gillan, Hess, and Blomeyer (2005) supported the growth of online learning in K-12 education. This research found that student outcomes were equal or better for online learning compared to face-to-face learning. A larger meta-analysis, finalized in 2010, by the U.S. Department of Education comparing online learning to traditional face-to-face learning, found only five studies at the K-12 level rigorous enough to be evaluated (Means, Toyama, Murphy, Bakia, & Jones, 2010). The study is consistent with earlier findings that, on average, students taking online courses performed better than students in the traditional class, but warned against generalizations at the K-12 level. Additionally, Cavanaugh, Barbour, and Clark (2009), in a less rigorous study focused solely on K-12 learners in virtual schools, examined existing literature. They found that empirical literature on the comparison of online learning at the K-12 level was inadequate.

The Cost of Online Learning

The continued growth of online learning will perhaps simultaneously raise questions about the anticipated costs associated with online learning. Picciano and Seaman (2010) identify cost as one of the barriers met by school administrators when trying to implement online learning. Watson and Gemin (2009), in a report for the iNACOL outline the necessary components for the implementation of an online learning program. In this report, they
emphasize financial support as the most important policy concern. Further, they remind decision makers that the cost of online learning can be advantageous because of the lack of maintenance, transportation, and facilities, but can also be detrimental due to the cost of a learning management system, hardware, and technical support. Research by Anderson, Augenblick, DeCescre, and Conrad (2006) found that the cost to implement an online school is estimated to be the same as a traditional brick and mortar school. Contrary to this, Battaglino et al. (2012) estimate the cost of virtual schooling to be $6,400 per pupil, which is lower than the national average of $10,560 for the 2011 fiscal school year (U.S. Census Bureau, 2013). However, the report also identifies virtual schools operating in a range from $4,000-$9,000, which is a large spread when considering available options and does not consider student outcomes. An additional concern with online learning and participation in virtual schools is whether or not the local school system or the virtual school is receiving the state per-pupil funding.

**Online Learning in Virginia**

Virginia is not new to digital learning. Beginning with satellite courses in the 1980s and then moving on to Web-based delivery, online learning in Virginia has transformed into Virtual Virginia (VVA). The main purpose from its conception has been to offer courses that were otherwise unavailable to students in the state. Online learning in Virginia would appear to be a priority with its recurring appearance in the General Assembly’s legislation. Most recently, in 2012, Governor McDonnell signed a bill requiring all students in Virginia to take at least one online course to graduate with a standard or advanced diploma. In addition, the Virginia Department of Education has made online learning a priority by evaluating vendors and publishing an approved vendor list to aid school systems in their decision-making process. Recent research in Virginia surveyed school superintendents on the use of online learning in their
school system (Becker et al., 2013). The research found that the number of students enrolled in online courses is continuing to rise, similar to the findings in the national survey by the Sloan Consortium (Picciano & Seaman, 2012). The Metropolitan Educational Research Consortium study also found that the two most common reasons for students to take online courses were for courses not offered at their local school or for credit recovery. Further, the researchers discovered the two main reasons for school systems to not make online courses available were cost and personnel issues.

**Cost-Effectiveness Analysis**

A cost-effectiveness analysis of two particular online learning programs seeks an answer to “how” the implementation of online learning can be most effective. Bakia et al. (2012) suggests that “cost-effectiveness studies often have two goals: (1) to inform decisions about a particular program under way in a particular location, and (2) to inform other stakeholders as they consider undertaking new programs of their own” (p. 5).

The need for information being sought in this study is supported by Battaglino et al., (2012). The authors state:

Ultimately, new technology-rich education models will need to be evaluated based on their productivity, that is, the results that they produce relative to the required investment. Unfortunately, within the nascent field of online learning, this information simply isn’t yet available. (p. 5)

This study examined two online learning programs, a teacher-developed program and a commercially acquired program, Edgenuity™ (formerly e2020, Inc.). A cost-effectiveness analysis following the methods of Levin and McEwan (2001) was implemented. An ingredients method establishing all available costs associated with each of the online learning programs was
The two were compared with the goal of providing policy makers with information on cost and effectiveness of two programs being offered in a school system. This study will help to provide a model for estimating cost and effectiveness of other online learning programs.

**Research Questions**

The research questions this study will examine are:

1. What is the difference in cost per unique enrollment between the Edgenuity™ online courses and the teacher-developed online courses?

2. What is the difference in the effectiveness of the Edgenuity™ online courses and the teacher-developed online courses based on passing the class and passing the Standard of Learning (SOL) End-of-Course Test (EOC)?

3. Which online learning program, Edgenuity™ or teacher developed, is better in terms of both cost and effectiveness?

**Design and Methods**

The data for this study were gathered from two different online learning programs currently used in a school system located in Virginia. Both a teacher-developed program and a commercially acquired program, Edgenuity™, were examined using quantitative methods for data collection. Both online programs are offered at all of the high schools in the school system. The teacher-developed program is offered both as credit recovery and credit accrual in the summer, and Edgenuity™ is offered during the school year also as credit recovery and credit accrual. The teacher-developed program has been offered since 2000 with an online physical education course as its first offering and other courses developed over the years. The school system began using Edgenuity™ at the beginning of the 2010-2011 school year.
I implemented Levin and McEwan’s (2001) cost-effectiveness analysis to realize the costs associated with the teacher-developed online learning program and Edgenuity™, a commercially acquired online learning program, and also examined the academic results of each program. This study collected financial information associated with both of the online learning programs as well as final grades and scores on the courses’ ensuing SOL EOC test. According to Levin and McEwan (2001), an advantage to a cost-effectiveness analysis is that “it can lead to more efficient use of educational resources—it can reduce the costs of reaching particular objectives, and it can expand what can be accomplished for any particular budget or other resource constraint” (p. 6).

Limitations

There are several limitations in this study. The study only uses data from one school system in Virginia. Therefore, the statistics and cost ratios obtained can only be generalized for this particular school system. However, the model used in this research is available as a resource to guide other school systems when faced with making a choice between two online learning programs. Another limitation in the study is that I am currently employed by the school system being evaluated. Lastly, this research will only evaluate two of the many types of online learning programs available to school systems.

Delimitations

The researcher recognizes three delimitations in this study. First, the SOL EOC scores and grades for the classes are existing data and the researcher is unable to randomly select the students who participate. Also, the researcher is not aware of any contributing factors for students to be chosen to participate in the particular online courses. The last delimitation is
exclusion data from the school system’s online physical education class. This particular class has only a pass/fail grading system and no SOL EOC test.
CHAPTER 2. LITERATURE REVIEW

Introduction to Online Learning

Online learning is a fast growing trend in education, particularly at the postsecondary level. In the fall of 2013, more than 7.1 million higher education students took an online college course (Allen & Seaman, 2014). This is an increase from the estimated 4.5 million in 2008 and equates to more than 33.5% of all college students taking at least one online course (Allen & Seaman, 2009). In K-12 education, online learning is still in the early stages of development and practice, but growing rapidly. In the most recent Sloan Consortium report, based on a survey of U.S. school district administrators at the K-12 level, it is estimated that at least one million K-12 students took online courses during the 2007-2008 school year (Picciano & Seaman, 2009). This is an increase from the reported 700,000 students enrolled in an online course in the 2005-2006 academic year (Picciano & Seaman, 2009). Most recently, a report published by the iNACOL estimates that 1.5 million students are enrolled in one or more online courses (Wicks, 2010).

Supporting the estimated increase in online courses being taken, Queen and Lewis (2011), in a report for the U.S. Department of Education, National Center for Education Statistics, documents more than 1,800,000 course enrollments in distance education courses, most of which were online learning and almost three-quarters coming from high schools.

There is little to no empirical research on online learning prior to 2006, and since then, although overall research has shown substantial growth, the literature examining the effect of
online learning on student outcome from rigorous research is extremely limited (Gray, Thomas, & Lewis, 2010). Much of the literature to date informing policy makers on K-12 online learning is nonexperimental and often based on the more readily available postsecondary research.

Although the practice of K-12 online learning is more than two decades old and the literature base is more than fifteen years old, this issue represents only the second special issue that has been published with a specific focus on K-12 online distance learning, and the first to be published by a major distance education journal [the other special issue was Volume 17, Issue 4, of the *Journal of Technology and Teacher Education*]. (Barbour, Archambault, & DiPietro, 2013, p. 1)

Further rigorous research, at the K-12 level, is essential to better inform school leaders on issues related to online instruction.

Although distance learning is not new, the creation of the World Wide Web and the Internet has redefined and redesigned the possibilities of distance education. Online learning can be synchronous, interaction between the teacher and student online at the same time, or asynchronous, communication occurs at different times for each participant (iNACOL, 2011). The availability of both synchronous and asynchronous learning has opened doors and provides options to both learners and schools that were never before possible. The flexibility of time and place, coupled with the ability to address various types of students, establishes online learning as a possible intervention for many of today’s educational issues. These characteristics have led to the rapid adoption of online learning by higher education and contributed to the continued increase in K-12 use of online courses as an alternative to traditional face-to-face instructions.

Despite the lack of rigorous research in the area of K-12 online learning, many states have implemented and grown their own virtual schools. Thirty-nine states now have state virtual
schools or state sponsored online learning initiatives (Watson, et al., 2010). Twenty-nine states, and Washington DC, have full-time online schools. Furthermore, school system level online learning programs exist or are being planned in approximately 50% of all school districts. In a more extreme attempt to put online learning at the forefront of education, in 2006, Michigan included the requirement of online learning for high school graduation. Alabama followed in 2008 and most recently, Arkansas, Florida, and Virginia have included the addition in legislation.

**Definition of Online Learning**

There are many terms in the field of education addressing distance education as a whole but it can be defined as “formal education in which a majority of instruction occurs while teacher and learner are separate” (Verduin & Clark, 1991, p. 8). While the origins of distance education do not strictly include digital technology for implementation, it has morphed into learning through the use of digital technology with a popular method known as online learning. Various definitions of online learning exist, but in general involve the separation of the teacher and student and the delivery of instructional content via the Internet or Web-based software (Cavanaugh et al., 2009; Smith, Clark, & Blomeyer, 2005; Watson et al., 2010). It includes instruction that occurs partially or completely over the Internet. A fully online course is one which most or all of the content is delivered using the Internet and usually has no face-to-face interaction, although the amount of time that constitutes “most” varies. A blended or hybrid course is a course in which part of the content is delivered using the Internet and part of the course is delivered through traditional face-to-face interaction.

The definition of a virtual school commonly used in research is that it is “an educational organization that offers K-12 courses through Internet- or Web-based methods” (Clark, 2001, p.
1). Russell (2004) uses the definition that virtual schools are “a form of schooling that uses online computers to provide some or all of a student’s education” (p. 2). The significance of using both of these definitions is to emphasize the premise that virtual schools are an “organization” or “a form of schooling” and offer a possible way of gaining credits toward a high school diploma outside of the traditional school. With the development of virtual schools on the rise, traditional schools offering their own online courses presents a competitive and valuable option to students with varying needs. Clark (2001) goes on to expand upon the variations of different types of virtual schools as follows: state-sanctioned, state level; college and university-based; consortium and regionally based; local education agency-based; virtual charter schools; private virtual schools; and for-profit providers of curricula, content, tool, and infrastructure. The categories of types of virtual schools are not standard, as other researchers have defined the classifications of virtual schools with some differences, but overall similar characteristics to those established by Clark (2001).

An early study by the USDOE in 2005, based on information from the 2002-2003 school year, revealed the possibility that blended courses may have greater promise than the fully online courses (Setzer & Lewis). This is supported in the most recent research by Allen and Seaman (2010) based on information acquired from school leaders’ responses to the 2007-2008 Sloan Consortium survey. Although participation in blended learning courses currently trails behind that of fully online classes, responses suggest a greater expectation for their growth. The 2009 and preceding survey results indicate a continued concern by school districts about the quality of online courses and the extent of preparation by staff to teach online classes (Picciano & Seaman, 2009). Although blended models are useful options for schools, this research will focus on fully online learning programs.
Current Use of Online Learning

An annual review from Evergreen Consulting reports that 39 states now have state virtual schools or state sponsored online learning initiatives, although these state virtual schools vary tremendously in their enrollment (Watson et al., 2013). Additionally, the existence of full-time online schools has also grown. These programs draw students from various school districts throughout a state and often exist as charter schools. Watson and others also report that 29 states, as well as Washington DC, have full-time online schools. This is an increase from their 2010 report where 27 states, and Washington DC, have full-time online schools and their 2009 which reported only 24 (Watson et al., 2009; Watson et al., 2010). Lastly, the Evergreen report states that individual school districts creating their own online learning programs, including both fully online and blended learning program, exist or are being planned in approximately 50% of all school districts.

The most recent report from the iNACOL states that approximately 1.5 million students are enrolled in one or more online courses (Wicks, 2010). This data are indicative of the rapid growth online learning has made, but the 2009 Sloan Consortium report, K-12 Online Learning: A 2008 Follow-up of the Survey of U.S. School District Administrators, better describes where this trend is heading (Picciano & Seaman, 2009). For the 2007-2008 school year, 69.8% of the 867 respondent school district administrators had at least one student take a fully online course. The results of the survey also indicate that 74.8% had at least one student take either an online or blended course during the same year. What is more telling of the continued growth of online learning is the 15% of school districts, currently with no students taking any type of online course, indicating the intention of offering some form of online course over the next 3 years. Additionally, administrators indicate that over the next 2 years, 66.3% of schools already
implementing online learning predict a growth in participation in fully online courses and 61.2% of the same schools predict growth in blended courses. Including both those districts currently offering online courses and those that do not, it is predicted that the rate of growth of enrollment in blended courses will be greater than that of fully online courses.

The results of the 2009 study are useful for estimating the actual number of students taking online courses and the growth of enrollment compared to the first report by the Sloan Consortium published in 2007 (Picciano & Seaman, 2007, 2009). It is estimated that 1,030,000 K-12 public school students were enrolled in online courses during the school year 2007-2008. This is a 42% increase from the estimate of 700,000 students in 2005-2006.

Picciano and Seaman (2009) reported a breakdown of responses by locale and grade level. Nearly 60% of the administrators that reported using online learning were from rural districts compared to the approximately 32% in urban areas. The high rate of rural schools offering online learning in the budding years is a product of the challenges small schools face both financially and in the limited supply of quality candidates. Picciano and Seaman (2009) also explain the use by rural schools as essential to “provide students with course choices and in some cases, the basic courses that should be part of every curriculum” (p. 3). To little or no surprise is the 69% of online enrollment taking place at the high school level. Although the majority of online courses are taken after middle school, the growth in enrollment since the 2005-2006 survey shows a fairly steady increase in use at all levels.

**Reasons for Offering Online Classes**

It is important for district superintendents to be well informed of the ways online courses can enhance the current instructional environment. A review of literature reveals multiple ways online courses meet the needs of a broad range of specific groups of students (Picciano &
Seaman, 2007, 2009; USDOE, 2009). Picciano and Seaman (2009) report that more than half of the school leaders who responded to the survey indicated the following as reasons for implementing online learning: meeting the needs of specific groups of students; offering courses not otherwise available; offering AP or college-level courses; permitting students who failed a course to take it again; reducing scheduling conflicts for students. A most obvious group of students who may benefit from online courses are AP students and students in rural settings with limitations to their course opportunities and qualified teachers. Yet, the research suggests school districts commonly use online instruction for credit recovery, dropout prevention, and as an option in correctional facilities. This exemplifies the analysis by Cavanaugh et al. (2009) that “distance education for elementary and secondary students is seen as a solution to several educational problems” (p. 1). In addition, this type of learning might also be utilized to prepare all levels of high school students for college, where online courses have become prevalent.

In a report for the USDOE and NCES, Queen & Lewis (2011) found that 62% of students enrolled in online courses were for credit recovery. The qualitative study by Jones (2011), which focused on student perceptions of online courses for credit recovery, found it a worthwhile option to decrease the high school dropout rate. The flexibility makes online courses excellent options for students who are at risk for graduating. Online courses for credit recovery are valuable because they are available to register at any point during the school year and can offer a variation from the traditional classroom experience (Dessoff, 2009). In addition, when discussing repeating a class in the traditional classroom, participants in a qualitative study by Jones (2011) “expressed that the factors that were implicated in their failing the course the first time (for example, distractions, pace of instruction, and lack of motivation) would be present the second time they took the class (p. 136).
The Source of Online Classes

Currently, five states, Alabama, Arkansas, Florida, Michigan, and Virginia have implemented legislation to mandate online learning in the public K-12 schools, while others recommend online learning. Many other states provide courses from the state department of education level as an endorsement of the value of online learning. The most common providers of fully online courses for K-12 public schools are colleges and universities with state departments’ virtual schools as the second most popular source. Contrary to this, blended courses were most often supplied at the school district level followed by offerings from postsecondary institutions in frequency of use (Picciano & Seaman, 2009). Two other resources utilized by a large percentage of school districts are independent vendors, who are gaining in number with the popularity of online instruction, and education service agencies. Additionally, it is not unusual for a school district to use the courses established in other localities, including out of state, for their own students. Many states, including Virginia, have an approval process for independent vendors to provide online courses or programs to multidistricts within the state. This would seem an appropriate method for safeguarding consistency with state and national standards while providing a high quality of learning.

The Effectiveness of Online Learning

The availability and convenience of online learning makes it a valuable option for K-12 schools looking to address educational challenges and offer a variety of options for students. However, the effectiveness of online courses compared to that of the traditional face-to-face classes is an important factor when making the decision to implement online courses. In the past 15 years, there has been a sufficient amount of research comparing the effectiveness of online learning with traditional face-to-face instruction in higher education. Yet, once again in the K-12
arena, the limited amount of rigorous research is an obstacle for decision makers considering
online courses as an option while maintaining the goal of high student academic achievement. It
would appear that current decisions to replace a traditional class with an online option are based
on a few meta-analyses published or generalizations from the existing but more rigorous research
in higher education.

The first published meta-analysis of online learning centered about K-12 education was
published in 2005 by Cavanaugh et al. The results of this research revealed that student
achievement in online learning was at least as good as traditional face-to-face instruction. The
thorough, large scale meta-analysis from the USDOE revealed only nine rigorous studies from
1996 to 2008 involving K-12 learning using experimental or quasi-experimental designs
comparing the learning effectiveness of online learning with traditional face-to-face learning
(Means et al., 2010). Subsequently, after additional evaluation, only five of the nine studies were
considered sufficient for inclusion in the meta-analysis, which relied primarily on older learners
in a variety of fields. The authors of this meta-analysis advise caution when applying findings to
the K-12 setting, although implications are offered. The findings for the USDOE’s meta-
analysis found that “students who took all or part of their class online performed better, on
average, than those taking the course through traditional face-to-face instruction” (Means et al.,
2010, p. xiv). Additionally, the USDOE reports that the effectiveness of online learning was not
affected by variations in the different implementations of online courses and it seems to be wide
ranging across variations in content and types of learners.

A recent review of literature by Cavanaugh et al. (2009) supported the challenges of
limited existing research in K-12 virtual schooling. The authors focus on “virtual schools” rather
than online courses, yet, accept the definition of virtual school by Clark (2001), which includes
online courses in its broad definition. This review was not as selective as the one by the USDOE (2009) with consideration to rigor, as it relied on all existing open access literature regardless of method. However, Cavanaugh et al. (2009) limited their review to K-12 virtual schooling only, rather than including higher education and older learners. Their review, which included 226 publications, found that recent literature (from 2000 to 2008) most commonly emphasized “statewide and consortium/multi-district virtual schools, the roles of teachers and administrators, the promise of virtual schooling and its initial rationale for implementation, administrative challenges, the technology utilized and interaction with students” (Cavanaugh et al., 2009, p. 12). In addition, supporting other researchers, the authors noted the inadequate existence of empirical research.

Student and administrator perceptions of the quality of online learning compared to traditional instruction also support the effectiveness of online courses as an alternative. In 2008, the National Survey of Student Engagement found that students taking online courses reported “more deep approaches to their learning” associated with online learning (p. 16). The most recent Sloan Consortium report on higher education stated that 66% of school academic leaders reported that online learning outcomes were at least the same if not better than those of the traditional face-to-face learning (Allen & Seaman, 2009).

In summary, there is evidence to support the use of online courses as an alternative to traditional face-to-face classes. The clear findings for higher education and other older learners demonstrate the positive effect of online learning on student outcomes. However, the lack of rigorous research in the K-12 arena leaves leaders to continue to question the effectiveness of online courses. Decision makers are forced to rely on evidence from higher education or the similar findings of a positive effect from the small number of K-12 studies when making
decisions. Because the increase in the employment of online courses in K-12 schools further expands the population of users there is a growing need for more research in order to warrant online courses as a suitable option for replacing the traditional face-to-face classes (Scherer, 2006).

**The Cost of Online Learning**

The increased use of online learning is likely to establish questions pertaining to the costs associated with implementation. Watson et al. (2010) highlights the possible effect of recent budget cuts on the growth of online learning by stating that, “Constrained education budgets, new policy developments, and changing technologies are accelerating growth in some areas while slowing growth in other segments, but the growth trend persists” (p. 6). The authors go on to state that as of 2010, online options are available in 48 states, and Washington DC, but no one state “provides the full range of potential online learning opportunities-supplemental and full-time options for all students at all grade levels” (p. 6). It is possible that cost may be an obstacle in the forward progress, yet at the same time, in another school system, contribute to the growth of online learning. School systems that have already budgeted for and implemented one-to-one laptop initiatives may find online courses to be of reasonable cost since they have already invested in bandwidth, a learning management system and may be able to reduce personnel. Aside from that, states have not figured out how to fund schools for students attending online schools, which may be cost prohibitive for some schools but benefit others.

The Sloan Consortium is in its eighth year reporting on the utilization of online learning in K-12 schools (Picciano & Seaman, 2009). The report is based on the results of a national survey of K-12 school district administrators and its replication has provided information on and monitoring of the K-12 online learning landscape. One important finding over time is that
approximately 700,000 students were enrolled in online courses during the 2007 study but by the 2009 study, that number grew to approximately 1,030,000 students. It seems that this growth will continue. The Sloan Consortium survey results for higher education found that “sixty three percent of all reporting institutions said that online learning was a critical part of their institution’s long term strategy” (Allen & Seaman, 2010, p. 2). In addition, the survey of K-12 leaders found that 66.3% of the districts expected growth in their online course enrollment (Picciano & Seaman, 2009). With this anticipated growth, school districts in the K-12 environment must prepare for this transition and the decisions that lie ahead.

The research by Picciano and Seaman (2009) uncovered multiple obstacles identified by school administrators faced with attempting to offer online courses. One such concern was development or purchasing costs. The authors go on to explain that “these are valid concerns that need to be addressed by state and local education policy makers” and that cost “represents a genuine barrier to the development of online and blended learning courses” (Picciano & Seaman, 2009, p. 19). The use of online courses often is seen as cost beneficial. It reaches students in rural areas, where the cost of a classroom and teacher for small numbers of students may be unaffordable; yet, it remains a concern evident from recent research. Picciano and Seaman (2009) explain that:

If administrators decide to develop their own online courses, substantial financial investment needs to be made in hardware and software infrastructure, teacher training and support services. The initial investment for these can be prohibitive. However, if a school contracts out for the majority of its online and blended learning courses, the cost of the provision of local support services will probably be offset by the savings incurred by having to offer fewer courses in face-to-face mode. (p. 23)
With the limited research in the K-12 environment pertaining to online instruction, it is of no surprise that the information on the cost of online learning is also scarce. The report by Picciano and Seaman (2009), a result of a district administrators survey, supplies a good starting place for what kinds of online instruction are being used nationally, but policy makers are left blindly attempting to make appropriate decisions on how to offer online courses within their budgetary means. Participation in state virtual schools is growing rapidly but funding for these programs has not kept up with advancing enrollment (Thomas, 2008). The most comprehensive information on funding for online learning was produced by the iNACOL and written by Watson and Gemin (2009). This framework outlines principles that demonstrate important facets and procedures that quality online learning should include. It provides a useful background on what should be considered for implementation. The authors address funding as “the single most important policy issue in online learning” (Watson & Gemin, 2009, p.10). Additionally, they explain that:

Online schools are full-service public schools with many of the same costs as their brick-and-mortar counterparts, including salaries, benefits, initial training, and ongoing staff development. Online programs do not incur the same level of facilities and transportation costs as traditional districts, but they have significant technological components, with associated costs for hardware, bandwidth, and the like, which are critical to supporting the teaching and learning process. In addition, other costs, such as teacher travel for face-to-face training, telephone technology, and technical support, must be considered. (p. 10)

It may be the most important policy issue, but the data and research supporting decisions on funding online learning are narrow. The research comparing the cost of online schools to traditional schools is also inadequate. Anderson et al. (2006) concludes that
the cost to implement an online school is approximately equivalent to the costs of operating a traditional school. There are also a few documents available from state legislatures of funding allocated for state virtual schools. Unfortunately, districts remain unaware of the funding that will be required for implementation of online courses, and it does not address the varying costs of different online platforms for comparison and decision making.

Recently, Battaglino et al. (2012) attempt to compare the costs of digital learning to the costs of face-to-face traditional learning with the goal of contributing to further research on overall productivity, student achievement relative to cost. The most valuable finding from this research is that the authors “caution readers against looking for one simple ‘price tag’ for online learning, or assuming that savings necessarily translate into a lower overall cost per pupil” (p. 56). The research outlines the cost categories synonymous to the ingredients approach recommended by Levin and McEwan (2001). Battaglino et al. (2012) identify the limited amount of outcome data and its variation across school systems as an obstacle. The authors conclude that “absent broadly accepted measures of student achievement [the ‘output’ side of the productivity equation], calculating productivity is extremely difficult” (p. 75). In addition, the second challenge identified is that school systems are stuck in their ways and rarely have the resources to pursue the best option based on productivity. The need for additional research related to productivity including cost and educational outcomes will be valuable.

**Online Learning in Virginia**

Virginia, like many other states, is forging forward in its ability to offer quality online learning. The Virginia Department of Education has been providing AP and world language courses via satellite since the 1980s. This developed into Web-based delivery
in the end of the 20\textsuperscript{th} century and most recently is known as Virtual Virginia. Virtual Virginia offers AP, world language, core academic, and elective courses to students in Virginia and throughout the United States. The main goal of Virtual Virginia is to serve students with classes that are otherwise unavailable in their school or because of scheduling conflicts.

In 2010, the Virginia General Assembly passed legislation that had a focus on improvement and growth in virtual education. This bill, known as “The Opportunity to Learn,” exemplifies the continued focus on the growth and improvement of online learning. Also, in November of 2010, the Virginia Board of Education created criteria for online providers to ensure that Virginia students receive quality services that parallel the Virginia Standards of Learning and are facilitated by highly qualified teachers. More recently, in April of 2012, in an attempt to further expand online learning, Governor Robert McDonnell signed into law a bill that will require students in Virginia to take at least one online course to graduate with a standard or advanced diploma.

As of March, 2013, there are 18 approved multidivisional providers on the Virginia Department of Education’s “provider list” for fully online course offerings. As a multidivision provider, they can offer courses across school divisions in the state of Virginia. The list consists of a few school divisions, a few state or college programs, and many for-profit vendors. Some of the for-profit vendors being Apex Learning, EdisonLearning, Inc., Edgenuity\textsuperscript{TM}, and K12 Virtual Schools, LLC.

In a study by the Metropolitan Educational Research Consortium, a partnership between Virginia Commonwealth University and the public K-12 school systems in the metropolitan Richmond area, the landscape of online learning was examined (Becker et
al., 2013). The research found that although calculating the actual number of students enrolled in online courses was not possible, “There are clear indicators that the number of students in Virginia taking online and/or blended learning courses is rising and will continue to rise” (Becker et al., 2013, p. 25). The research, which reported information from superintendents in Virginia, found that students were most commonly taking courses for credit recovery or because the classes were otherwise not offered in their local school, which often refers to AP and higher level courses.

The survey research also concluded that there are still barriers to continued growth in online learning. The two most prevalent barriers cited were cost and personnel issues. Cost issues are always a battle with new reforms, and with online learning, this uneasiness is nationwide with how state funding formulas are dealing with students taking online courses outside of the districts’ jurisdiction. In addition, the recent budget cuts may contribute to superintendents and school boards making slower progress with reforms that redistribute or demand new funding. In the study’s recommendations for future research, analysis of both cost and effectiveness are noted as important areas needing continued research. The authors encourage researchers to develop models of determining the actual costs of online learning programs. “The more those bodies of research and analysis can be combined, the closer we come to generating the evidence we need about the cost-effectiveness of various models of online and blended learning courses and programs” (Becker, et al., 2013, p. 26).
CHAPTER 3. METHODOLOGY

Statement of the Problem

The implementation of online learning in the K-12 education sector has grown tremendously over the past 15 years. The pressure to improve 21st century skills and keep up with the advances in technology, are influencing schools systems to make online options available to their students. In addition, online learning offers the ability to meet the needs of specific groups of students, offer courses not otherwise available (for remediation or enrichment), and reduce scheduling conflicts (Picciano & Seaman, 2009). This educational option offers benefits to students and school systems as a whole, which may be too valuable to ignore. Yet, the decision of how much budgetary value should be placed on implementing online learning in the K-12 level is also a responsibility that school leaders cannot take lightly.

The implementation of The No Child Left Behind Act of 2001 (U.S. Department of Education, 2000) influenced the state of Virginia to establish the Virginia Standards of Learning. These minimum requirements for a standard diploma include passing a set number of courses in each subject and the associated Standard of Learning (SOL) End of Course Test (EOC). Although it is still being examined, there is research showing that students taking online courses perform at least as well as students in the traditional classroom (U.S. Department of Education, 2009). The responsibility of the school system now is to evaluate which online program would better meet the goals specific to the school system when trying to meet the State of Virginia Standards.
As of the 2011-2012 school year, the State of Virginia has an average per-pupil expenditure of $10,969 (Superintendents Annual Report, 2013). This is from a budget in Virginia of 15 billion dollars and is down from the $11,020 during the 2009-2010 school year. Recent budget cuts at the federal level trickling down to the state government and in turn to the local school districts have made balancing the budget difficult. Most districts are forced to scale back on expenditures and more closely consider the benefits before implementing new programs. While schools are attempting to keep up with current trends and technological advances, they are often limited by financial restraints. A report by the Thomas B. Fordham Foundation (Battaglino et al., 2012) evaluated the cost of virtual schools and estimated the cost per pupil to be $6,400. This savings, compared to the previously noted cost in Virginia of $10,969 per pupil for traditional schooling, is a benefit to school districts planning on offering online learning. However, the report also stated that the estimates varied and there are virtual schools operating below $4,000 per student and above $9,000 per student. This broad range of spending is something to be aware of when choosing an online option. The report also goes on to warn that the costs estimates are not an indicator of quality or student outcome.

The proliferation of online learning has left no shortage of options when considering offering online courses. The choices, offered by local universities, commercial providers, local school districts, and state sponsored virtual schools, further encourage joining those already implementing online courses. When schools are ready to incorporate online learning as part of their curriculum they should be prepared with the knowledge of the expected costs associated with various programs in addition to any knowledge on the prior results pertaining to achievement using each type of program.
At first glance, the idea of online learning appears to be a win-win situation because of research supporting the effectiveness of online learning as well as research indicating that the cost of online learning has a lower estimated per-pupil expenditure than the per-pupil expenditure in the traditional classroom (Battaglino et al., 2012; U.S. Department of Education, 2009). However, there are still decisions to be made other than just whether to offer online learning or not. Online learning is available in a variety of platforms including state virtual schools, independent commercial companies, and local teacher-developed courses. It is the responsibility of the school leader to choose an online learning program that meets both the achievement goals and financial constraints of the individual school system.

**Online Learning in a Virginia School System**

This study focused on students enrolled in either a teacher-developed or an Edgenuity™ online learning course in a particular suburban school system in Virginia. This school system has a one-to-one laptop initiative in which students receive a laptop from the school system at no cost of their own. The students participating in these online classes are either taking the course for credit recovery because they failed a required course, or for credit accrual because they are trying to get ahead in credits.

**Teacher-Developed Option**

The teacher-developed online courses in this particular school system are offered as part of the summer school course offerings. Currently, the core academic courses offered are in English 12, Geometry, Virginia and U.S. History, Virginia and U.S. Government, and Earth Science. Students pay $300 to take the summer school course. Students and teachers are required to meet face-to-face for an orientation, a midterm, a final exam, and if applicable, to take an ensuing SOL EOC test. The orientation meeting is used for directions and laptop
distribution as part of the school system’s one-to-one laptop initiative. Other than these meetings the remaining time, which accounts for more than 80% of the learning, is done online. The teacher-developed classes require that students have access to the Internet. The classes are completed using video instruction, webcasts, on-line chat periods, and feedback via e-mail. All assignments and assessments, other than the required face-to-face meetings, are completed online.

**Edgenuity™ Option**

The commercially acquired Edgenuity™ online courses are offered in this particular school system during the regular school year. Edgenuity™ is offered at every high school in the county, including the detention center and schools with nontraditional programs. Student selection guidelines for Edgenuity™ vary by school, but are primarily used for credit recovery. Each high school implements the process based on their current focus, which may be on-time graduation by focusing on juniors and seniors, or lowering the at-risk population focusing on ninth and tenth graders. Students continue to go to school and follow a typical schedule with Edgenuity™ as one of their classes in the normal 7-period day. They meet in a classroom with a facilitator who is trained in best practices and each course is capped at 15 students. The program is based on modules which have pretests to determine the number of hours, or seat time, that need to be completed and mastered. The course must be completed within 18 weeks, but may be completed faster based on the students’ pace, which allows students the ability to continue with classes for credit accrual. The modules can be worked on from anywhere the Internet is available, but new modules and assessments can only be released by the facilitator. Students receive grades for the course from module success and also take the SOL EOC test.
Purpose of the Study

The purpose of this study was to compare the cost effectiveness of two online learning programs used in the same school system. The two programs compared were Edgenuity™, a commercially acquired online learning program and teacher-developed courses. “It’s impossible to put a single price tag on ‘online learning’... it comes in widely varying levels of quality and efficiency” (Battaglino et al., 2012, p. 1). This quote from the summary of the article, produced by the Thomas B. Fordham Institute, highlights the reason that neither cost nor effectiveness should be a sole method of evaluating an online program. With online learning options continuing to grow in the K-12 education setting, consideration must be given to both the effectiveness and cost. Additionally, this research created a model to follow for the evaluation of the cost and quality of various online course programs for school systems to use when considering implementation of online options in the K-12 educational setting. This model was based on the suggestions of Levin and McEwan (2001) and considered not only the overall cost to the school system of the implementation of online courses but also the effectiveness, evaluated by grades and scores earned in the courses.

Research Questions

When schools decide to add an online learning program to their current curriculum, there are some important questions that need to be answered to make a decision that is both academically and financially sound. The research questions this study examined were:

1. What is the difference in cost per unique enrollment between the Edgenuity™ online courses and the teacher-developed online courses?
2. What is the difference in the effectiveness of the Edgenuity™ online courses and the teacher-developed online courses based on passing the class and passing the Standard of Learning (SOL) End-of-Course Test (EOC)?

3. Which online learning program, Edgenuity™ or teacher developed, is better in terms of both cost and effectiveness?

**Conceptual Framework**

The idea for this research evolved from recent work by the Metropolitan Educational Research Consortium (MERC) involving a survey of the Virginia school districts pertaining to their use of online courses. The purpose of the survey was to gather and disperse information on how and why online classes were being used in Virginia K-12 schools. My exposure to this study led to many questions being formulated with respect to what a school leader’s next step would be once he or she has made the decision to offer online courses. The research by MERC made available information on the current use of online courses. While this information is valuable, how to choose between the various options and what should be considered when adopting an online program is not discussed and, therefore, left up to the individual school system. The obvious attraction to a particular online program would be student success. Research supports using online courses because the learning outcomes are at least as good as traditional face-to-face learning (U.S. Department of Education, 2009). However, this research makes no distinction between the possible differences in outcomes from the various providers of the same course. Additionally, when considering options, especially in the public sector, cost must always be considered. My exposure to the use of online courses from the MERC research led to additional questions that I felt were necessary to explore. How much do online programs cost? What are the differences in achievement? How do you choose between different options?
This study used a quantitative approach implementing Levin and McEwan’s (2001) cost-effectiveness analysis. It compared a commercially offered online program from Edgenuity™, with a teacher-developed online program in the same school system. Levin and McEwan (2001) state that the purpose of a cost-effectiveness analysis is “to provide a method for choosing among alternatives in order to select those that are able to accomplish a given result most parsimoniously” (p. 1).

**Research Design**

This study examined the costs and outcomes of two different online learning programs used in one Virginia school system, using existing data from the school district. The sample included all students enrolled in either of the online programs at all schools within the system offering both programs. The data for this research were gathered from the 2010-2011 and 2011-2012 school years.

A cost model of the two programs was developed using the Edgenuity™ program expenses and the teacher-developed online program expenses. Outcome measures included students’ grades in both online program courses and the students’ SOL EOC test scores. I used Levin and McEwan’s (2001) ingredients method to calculate the cost of both types of online learning programs. The student scores were used to determine the effectiveness of each program.

**Cost Analysis Framework**

The purpose of a cost analysis is to calculate the amount of money needed to implement a program and is used in all industry, including education. Levin and McEwan (2001) explain that there are four different types of cost analysis including: cost-effectiveness analysis, cost-benefit
analysis, cost-utility analysis, and cost feasibility analysis. Although often confused, each is unique and addresses a specific goal. Levin and McEwan provide the following definitions:

- Cost-effectiveness (CE) analysis refers to the evaluation of alternatives according to both their costs and their effects with regard to producing some outcome.
- Cost-benefit (CB) analysis refers to the evaluation of alternatives according to their costs and benefits when each is measured in monetary terms.
- Cost-utility (CU) analysis refers to the evaluation of alternatives according to a comparison of their costs and their utility or value. “Utility” is a term to express the satisfaction derived by individuals from one or more outcomes.
- Cost-feasibility (CF) analysis refers to the method of estimating only the costs of an alternative in order to ascertain whether or not it can be considered. (p. 30)

Cost-Effectiveness Analysis

I chose a cost-effectiveness analysis for this research because it evaluates alternatives rather than examining a single program. In this case, I compared the costs of two different approaches to online learning. Additionally, this study was also concerned with the effect of an online learning program on student outcomes, keeping consistent with the state graduation requirements. A school system must make an optimal decision on which offering will better prepare students to successfully pass a course and the ensuing SOL EOC and to also make a responsible choice when spending public funds. Levin and McEwan (2001) stated, “When costs are combined with measures of effectiveness and all alternatives can be evaluated according to their costs and their contribution to meeting the same effectiveness criterion, we have the ingredients for a CE analysis” (p. 10).

Establishing an Analytic Framework

Prior to initiating a cost analysis of any type, Levin and McEwan (2001) recommend developing an analytic framework. They believe the following should be included in the framework: identifying the nature of the problem, clarifying the specific alternatives that should
be considered in the analysis, establishing the identity of primary and secondary audiences for the analysis, and selecting the type of cost analysis to use.

**Identification of the problem.** School systems are experimenting with programs to better provide for the needs of their students, yet simultaneous budget cuts can thwart many of the efforts to explore possible options for increasing offerings or adopting interventions that may have a positive effect on student achievement. Research associated education has shown the efficacy of online courses as at least equal to that of face-to-face learning (Allen & Seaman, 2010). The choices vary from state virtual schools, independent commercial companies to locally developed courses. Research comparing the cost and effectiveness of these different online choices is necessary to making an informed decision on which program to implement. This study focused on comparing two of the available online learning programs, Edgenuity™ and teacher-developed courses, to establish the best option when considering cost and effectiveness. It is the responsibility of the school leader to choose an online learning program that optimizes both cost constraints and achievement success.

**Establish the alternatives.** According to Levin and McEwan (2001), “the objective is to make the best selection from competing alternatives” (p. 34). It is because there are choices that a cost-effectiveness analysis is necessary and useful.

**Online alternatives.** Establishing the alternatives for this cost analysis is based on what is currently being used in a local and accessible school system. Edgenuity™ and teacher-developed online programs are being used most frequently in the school system that was evaluated and were able to provide the most data for analysis.

**Effectiveness alternatives.** The increased accountability put on all states from the No Child Left Behind Act of 2001 has resulted in new challenges for schools and students. More
difficult courses and graduation standards coupled with the expectation that all students meet the demanding standards has school systems seeking new ways to achieve more. In Virginia, students are required to pass: 4 English courses; 3 math courses, algebra 1 and above; 3 laboratory science courses; and 3 history courses. In addition, students must also pass the ensuing EOC test associated with each class. Success in the courses required for graduation is measured by both passing the class and the associated EOC test. As a result of these requirements in the state of Virginia, this study used the grade in the course taken and the results of the SOL EOC test (proficient or fails to meet) as outcome data to analyze effectiveness of the online learning program.

**Specifying the primary and secondary audience.** The primary audience for this study is the superintendents, school board representatives, and decision makers of the school system evaluated. The cost-effectiveness analysis of these two different programs currently offered by this school system offers valuable insight for current and future decision making. Additionally, this research can help in meeting the needs of schools eager to implement online learning by offering an accurate summary of the associated costs of all resources necessary for implementation of these particular programs while also providing a guide for what costs to consider for any other online program. In an attempt to not misguide secondary audiences, the research has reported in detail all expected costs, including those that were not directly paid out by the school system but are still associated costs.

**Selecting the specific cost analysis.** Selection of the most appropriate cost analysis to compare the two types of online learning, Edgenuity™ and teacher-developed courses, is dependent upon the ultimate goal anticipated from the implementation of the program. The goal of this study was focused on identifying the program in which students achieve the greatest
academic achievement, evaluated by passing the class and the SOL EOC test, at the least cost to the school system. In an attempt to utilize the most appropriate cost analysis, consideration was given to all four of Levin and McEwan’s (2001) methods of cost analysis: cost-benefit analysis, cost-feasibility analysis, cost-utility analysis, and cost-effectiveness analysis.

The use of a cost-benefit analysis was eliminated because of its necessity for both cost and benefit to be measured in terms of monetary value. Levin and McEwan (2001) explain that “any alternative must show benefits in excess of costs” (p. 14). The implementation of online courses does not increase revenue for high schools, although this might be a possibility for postsecondary institutions charging tuition for classes with the intention of increased income. A cost-feasibility analysis was excluded for this research because the ultimate goal of the decision is not solely whether a school can cover the cost or not. Although cost is important when implementing new programs in secondary education, there is typically another reason driving the need for the program. In this situation, it was assumed that schools have already committed to the expenditure associated with the addition of online courses but are faced with decisions based on the best combination of cost while also meeting the goals for the courses. A cost-utility analysis was not used, although it can be considered “a close cousin to cost-effectiveness analysis” (Levin & McEwan, 2001, p. 19). “Utility,” according to Levin and McEwan, measures preferences of individuals to express satisfaction with an implementation. The data on satisfaction or utility is considered similarly to effectiveness in a cost-effectiveness analysis and the cost and utility are evaluated in combination. The comparison of alternatives based on their cost and their utility is an adequate option, yet in this circumstance, the ultimate goal was passing a class and passing an SOL EOC test. The goal of passing the test and class
was better evaluated by measuring effectiveness through test results and grades rather than the
usefulness of the online program formed by an individual’s preference in a given setting.

I applied a cost-effectiveness analysis to compare Edgenuity™, a commercially acquired
program, and teacher-developed courses. An emphasis on effectiveness, measured by passing
the course and the accompanying SOL EOC test, and cost, measured by the associated funding
necessary to implement each program, best represented the information I sought to make a
choice between the two programs.

Cost-effectiveness analysis should be a topic of concern because it can lead to a more
efficient use of educational resources—it can reduce the costs of reaching particular
objectives, and it can expand what can be accomplished for any particular budget or other
resource constraint. (Levin & McEwan 2001, p. 6)

Data Collection

This study used existing data. I assembled the existing data into a cost model and used
existing grades and SOL scores as the outcomes. I employed an “ingredients” model, suggested
by Levin and McEwan (2001), in which all ingredients were identified and a value was placed on
each one. These values were then added together and a total “cost” of the program was
calculated. The authors state that “the cost of a specific intervention will be defined as the value
of all the resources that it utilizes had they been assigned to their most valuable alternative use”
(2001, p. 44). This cost analysis was based on opportunity costs, which assumed that a cost has
been experienced when using any resource because it cannot be used in other areas.

Contact with the school system’s research and planning department was made and an
application outlining the purpose of the research was submitted. I provided the school system
with cost worksheets (Appendices A and B) that were used to obtain the costs for the online
programs. The worksheet was created by applying Levin and McEwan’s (2001) “ingredients model” while working with the school system to establish areas of cost. Approval from the school system for data related to costs and students’ academic achievement in both online programs was granted.

Levin and McEwan (2001) discuss the benefits of a cost analysis in lieu of relying on a basic budget for cost information. First, the ingredients are not always identified in a normal budget. The use of volunteers and donated items, for example, are not found in the budget, but may have contributed to the successful implementation of a program. This is important for school systems interested in future implementation trying to estimate actual expenses. Second, some schools already have resources in place that contribute to the success of a program. These may not be considered in a budget as a related cost to that school, but again, to a school seeking implementation, it may be necessary. Third, many large scale budget items may be over or under represented as a budget item in a given year. Many maintenance repairs that are only expected one every few decades are not considered annually in a budget, yet Levin (2001) suggests their cost should be divided annually to represent a specific cost. Fourth, there are some items that are hidden within the items of a budget and not identified as a contributing cost to a given intervention. Last, most budgets are planned allocations and do not refer to how funding was actually distributed or what needs were associated with an intervention. A cost analysis cannot be used in lieu of a budget, but it also should not depend on the budgetary inputs as the sole expenditures related to implementing a new program. Identifying the ingredients and placing value on each is a method for accurately estimating the cost of an intervention which in turn supports decision making.
Identifying Ingredients

**Personnel.** The ingredients for personnel considered all the people necessary for the implementation of each type of online learning being compared. “This category includes not only full-time personnel, but also part-time employees, consultants, and volunteers” (Levin & McEwan, 2001, p. 49). Levin and McEwan further explain that personnel should be accounted for by their roles, qualifications, and time commitments. This category was also itemized by describing the specific responsibilities of personnel and the nature of their position. In addition, time was used and defined by a percentage of the total work time each person dedicated to the implementation of the online program.

**Facilities.** The ingredients for facilities considered all physical structures necessary for the implementation of each type of online learning being compared. “This category includes any classroom space, offices, storage areas, play or recreational facilities, and other building requirements, whether paid for by the project or not” (Levin & McEwan 2001, p. 49). All specifications and descriptions of such physical spaces were identified for the purpose of evaluating their value. Spaces shared or used outside of the program being evaluated were calculated as a portion of the total cost for use.

**Equipment and materials.** The ingredients for equipment and materials consider all supplies and items necessary for the implementation of each type of online learning being compared. This category includes “classroom and office furniture as well as such instructional equipment as computers, audiovisual equipment, scientific apparatus, books and other printed materials, office machines, paper, commercial tests, and other supplies” (Levin & McEwan 2001, p. 50). Similar to personnel and facilities, consideration was given and cost calculated for shared equipment and materials in addition to donated supplies.
**Other inputs.** The ingredients for other inputs allow for items that do not fall within the already defined classifications. Some examples offered by Levin (2001) are liability insurance and the cost of training at a local university. In the evaluation of online learning programs, consideration was given to the additional expense of networking functions necessary for implementation, including Internet platforms and software packages. Levin (2001) suggests that any item in this category should be defined in detail with a clear description of the function. Training and staff development time were also considered as “other inputs” for this research at the secondary level.

**Required client inputs.** The ingredients of required client inputs refer to any supplies or responsibilities expected on the part of the client or their families. Levin (2001) offers transportation, books, or food as examples of possible required client inputs. In the area of online courses, the obvious expenses evaluated were the cost of computer access for participation in the program. An additional consideration is transportation, which may need to be considered in some programs using online learning not utilized at home. Levin suggests that these items be included for the purpose of success of future replication of the program.

**Sources of Ingredients Information**

Levin (2001) recommend the importance of becoming acquainted with the intervention being analyzed. He states that this familiarity can occur: through a review of program documents, through discussions with individuals involved in the intervention, and through direct observation of the intervention (p. 53). In order to appropriately identify the ingredients necessary for the implementation, I read documents pertaining to the current implementation, discussed the process with individuals involved, and observed a current implementation for both sources of online courses. Through the use of a cost worksheet for both online course programs,
I ascertained information from administrative level on the associated costs for program implementation. The cost worksheets included the ingredient categories suggested by Levin (2001) including any additional items or possible areas of cost associated with both types of

Gathering Costs

The data utilized in this study were provided by the school system, directly from the central office department overseeing the two online programs of concern. In order to obtain information in a comprehensive yet clear and concise manner, I used a cost gathering worksheet to obtain the most accurate cost of each ingredient identified as a component of the online learning programs. The cost gathering worksheets are alike, in that they include all areas related to Levin and McEwan’s (2001) ingredients model, yet unique with respect to the specific features that each program may utilize. In addition, the cost gathering worksheets contain areas that allowed the school system representatives to extend the ingredients and include other items that may have been overlooked. See Appendix A for Cost Gathering Worksheet, Teacher-Developed Online Courses, and Appendix B for Cost Gathering Worksheet, Edgenuity™ Online Courses.

Placing Values on Ingredients

Following the identification of all necessary ingredients for a cost-effectiveness analysis between the two types of online learning, a value was placed on each ingredient. Levin and McEwan (2001) state that:

The cost to us is the value of what we must give up by using the ingredients in this way rather than in their best alternative use. Accordingly, a monetary measure of costs represents the monetary value of all of the ingredients when used in their best alternative use. In essence, it tells us the value of the sacrifice that we must make to use all the
ingredients for this intervention by providing a summary measure in dollars of the value of the ingredients in other uses. (p. 60)

The authors also explain that the two ways of obtaining the value of an ingredient are by using the market value or shadow value. The market value is used when the ingredient has a known, obtainable value in a competitive market. The market value of an ingredient is optimal because the prices are “readily” available and it is a simple way to acquire the necessary cost data.

The other way to obtain cost data is using what Levin and McEwan (2001) refer to as shadow prices. When competitive market values are unavailable because of a lack of a market for the item or an inaccurate available cost, a value must still be placed on the ingredient for an accurate cost analysis to be completed. In cases such as these, the authors assert that it is necessary to find an appropriate cost of the ingredient by tweaking the data that are available to estimate a suitable cost.

There are some situations where a typical cost would not need to be calculated because of the knowledge that under all situations being evaluated this cost would not vary. “Both alternatives assume that students will continue receiving the standard schooling services, so these need not enter the analysis” (Levin & McEwan 2001, p.48). However, Levin (2001) emphasizes the necessity to remain concerned and include any further costs or incremental services necessary for each of the program implementations evaluation. This study contained a few costs that were not ascertained because in both situations being evaluated the students received these services regardless of their involvement of the program.

**Personnel.** The personnel costs associated with an intervention or new program can typically be gathered from payroll information (Levin & McEwan 2001). It is necessary to include all fringe benefits also received by the employee when calculating personnel costs.
These include health and life insurance, contributions to pension plans or other savings plans, and any other costs that benefits the employee. In many instances, these costs come at a particular percent of the employee’s salary, and can be calculated accordingly rather than an individual item line for each benefit. Personnel costs are usually available, but with some new programs, estimations of benefits or salary may need to be calculated if responsibilities of this type have not been utilized before. Personnel costs were obtained for both of these online programs and include benefits associated with the salaries.

**Facilities.** The cost of facilities in a program evaluation depends on whether the space is leased or owned (Levin & McEwan 2001). When a building is leased, then the portion of the space being used for a particular program is calculated by multiplying that portion by the annual cost to rent. In other situations, the building is owned. This is much more complicated, because the cost of depreciation and the value of the undepreciated part of the facility must both be considered when estimating cost. Levin (2001) explains the process as using the value of the facility divided by the number of years in its life span to obtain the cost of depreciation for each year of use and multiplying an “appropriate interest rate to obtain the opportunity cost of having resources invested in the undepreciated portion of the facility” (p. 67). These two values added together find the total annual cost. When considering online learning options, calculating facility use is essential. Online courses are attractive to many because they can be accessed from any location. However, the implementation of different programs may vary in their use of facilities. Some online learning programs use typical classrooms for students to learn during the school day, whereas others may meet only once or twice over the course of the semester, and some, not at all. The facility costs associated with different implementations can vary greatly.
Equipment. Equipment costs for the implementation of programs are acquired in a similar manner to facilities (Levin & McEwan, 2001). Determining whether the equipment is rented or owned is the first step, and then an estimation of the annual cost can be ascertained by using an annualization factor and the usable life, in years, of the equipment. This is similar to finding the cost of facilities, because it is important to account for the depreciation of the equipment items and also consider the cost as money unavailable for other uses. It is also necessary to estimate the value of any items used that are donated or borrowed. When a cost of equipment is unknown, the replacement value can be used to estimate an annual cost for the item.

Supplies. The supplies category is the most difficult to appropriately calculate (Levin & McEwan 2001). It is laborious to account for every item used and assign it with the actual market price. Examples of supplies, which are difficult to calculate, are items such as paper, pencils, ink cartridges, paper clips, folders, and other items used daily. Levin (2001) explains that these costs are only a small proportion of the final cost of a program and errors in their estimation do not blatantly affect the actual cost. Levin asserts that supplies typically account for less than 5% of a program’s budget and a 20% margin of error in the supplies’ cost calculation will appear as only a 1% error in the final calculation of program costs. Using this rationalization, the costs of supplies can be estimated “by simply adding the total expenditures on supplies to the estimated value of those that are contributed” (p. 71). However, if supplies are a significant part of a program implementation, allocation of sufficient time to this calculation would be necessary.

Client inputs. Other client inputs, which refer to the costs incurred by the participants or their families, will be evaluated by their individual costs, dependent upon the type of item (Levin
Some typical items in this category are transportation and, for online learning, the use of a computer. Transportation provided by the school system can be calculated using the district’s cost per student. The cost of a computer can be estimated as a school’s equipment cost, when provided by the school, but when not the case, it will be estimated as a client input. Levin advises that the importance of including all expenses regardless of the payee when evaluating cost is done with the goal of being comprehensive, for use by anyone interested in estimating cost, notwithstanding where the funds are coming from for each particular school district.

**Analyzing Costs**

This cost analysis followed the ingredients method, framed by Levin (2001), and placed values on all elements of each of the two online learning programs. The methods associated with determining a cost for each ingredient, as described previously, was applied and all the associated costs were added together and an estimate of the total annual cost of each program was found. Subsequently, Levin recommends using a cost worksheet, once the values have been placed on ingredients, to clearly see and evaluate costs. The researcher used cost worksheets similar to Levin’s in this study to obtain the costs associated with the program and to total the costs. See Appendix A and B.

The cost worksheet allows clarity for each of the category costs, the total cost, and when the cost worksheet is complete, the total cost derived can then be divided by the number of students to calculate a cost per student for each of the particular online learning programs (Levin & McEwan 2001). Moreover, the cost worksheet “also adds a new dimension to the analysis by enabling us to ascertain who is paying the costs for each alternative” (Levin & McEwan 2001, p. 79). There is value in this aspect of the cost worksheet. School leaders can realistically evaluate
the costs and make decisions based on the resources of their own school and consider how a new program may affect other organizations, government agencies, or students and parents with consideration to the amount of financial support they will need to give or the school will have to compensate for. “If the study were to be limited to only those costs that were paid for by the initial sponsor, they will give a misleading picture of the true overall costs” (Levin & McEwan 2001, p. 80).

The cost worksheet also allows for justification of any cash subsidies required or provided for by someone or group other than the school system itself (Levin & McEwan 2001). Cash subsidies might include donations or fees charged for access to the program. These costs can be taken away from the amount the school system is responsible for and added to the appropriate sponsor, but it will not change the total cost of a program. Similar to the cash subsidies, the cost worksheets include grants and contributions for other places including government agencies. Many school systems receive special state and federal funding if they are classified in a particular manner associated with particular programs. This funding may cover costs associated with programs being evaluated in a cost-effectiveness analysis and should not be disregarded as actual costs. Particularly, when other schools follow suit, but do not receive the same funding.

This method of cost analysis was completed for each of the two online learning programs. The information ascertained has been combined with the results of the research on the effectiveness of the two options for online learning. Together, these results have been used to compare the two programs.
Measuring Effectiveness

In general, new programs are offered with the goal of making an improvement in some area. Oftentimes, in education, the decision-making focus is on improving students’ academic achievement. When considering online learning, it is essential to be well informed of the effectiveness of online courses versus that of the traditional classroom courses when opting to offer online courses. However important as that comparison may be, for this research it is assumed that the decision has previously been made to offer online courses. Therefore, the useful information in this research is the differences in effectiveness between two available options of online programs. Coupled with the information gathered on cost, this research analyzes the benefits of two online learning programs with consideration to both the cost and effectiveness rather than each as an individual measure for decision making.

Similarly to cost concerns, you would not purchase a program that you were unable to pay for and you would also not adopt a program that did not contribute to meeting the academic goals of the school system. Acknowledging the differences in interpreting effectiveness, Levin and McEwan (2001) emphasize that “the measure of effectiveness chosen should reflect as closely as possible the main objective of the alternatives” (p. 108). It is likely that the online programs being evaluated may offer online courses that are currently required as part of a student’s graduation requirements, as well as elective courses. This research focused only on courses that are taken as core subject area requirements for graduation. In addition, considering that most states require students to pass an ensuing EOC test associated with the course, this research analyzes the effectiveness of the online course by measuring the number of students who passed the course and the number of students who passed the EOC test associated with the class. These two measures of effectiveness are synonymous with the requirements for
graduation, and clearly represent the main goal for students enrolled in these particular online courses.

Analyzing Effectiveness

The units of effectiveness are the number of students who successfully passed the online course taken and the number of students who successfully passed the EOC test associated with the course taken. In addition to an overall comparison of effectiveness between the two programs, the research also examined differences in the characteristics of students. The research also examined the background information of students to create equivalent or eliminate nonequivalent groups for the purpose of ensuring a valid comparison of data. The background included factors such as the reason for taking the course (credit recovery or credit accrual), gender, grade level, socioeconomic status, and ethnicity, all of which is existing data.

Combining Costs and Effectiveness

The final step in a cost-effectiveness analysis is to combine the results of the cost estimates and the analysis of effectiveness. Levin (2001) describes this combination as a ratio that can be ordered for each program based on either a desired effectiveness at the lowest cost or the level of effectiveness for a particular chosen cost. He further explains the calculation of the cost-effectiveness ratio (CER) to be the Cost (C) of the given program divided by its effectiveness (E):

\[ CER = \frac{C}{E} \]

This ratio can be described as “the cost required to obtain a single unit of effectiveness” (Levin & McEwan 2001, p. 135). These ratios then can be ranked from the lowest cost-effectiveness ratio to the highest cost effectiveness, with the lowest being the most cost effective.
this ratio, with regard to online programs, will communicate the funds needed for each student to successfully pass the end of course test for each program.
CHAPTER 4. RESULTS

Introduction

The purpose of this research was to gather and compare both cost and effectiveness data for two online learning programs. The two programs analyzed are Edgenuity™, a commercially acquired online learning program, and a teacher-developed online learning program. The data gathered were chosen to best answer the following research questions:

1. What is the difference in cost per unique enrollment between the Edgenuity™ online courses and the teacher-developed online courses?

2. What is the difference in the effectiveness of the Edgenuity™ online courses and the teacher-developed online courses based on passing the class and passing the Standard of Learning (SOL) End-of-Course Test (EOC)?

3. Which online learning program, Edgenuity™ or teacher developed, is better in terms of both cost and effectiveness?

This chapter presents the findings of the evaluation of the two online programs by utilizing Levin and McEwan’s (2001) ingredients method and cost effectiveness analysis to answer the research questions. Detailed information regarding the cost ingredients was gathered to calculate a per-pupil cost for each of the programs. The results of the SOL EOC test scores measured the effectiveness of each program. Levin and McEwan’s (2001) Cost Effectiveness Ratio (CER) determined by Cost/Effectiveness was used to determine which online learning program was most effective when also considering cost.
Edgenuity™ is offered during the regular school year and regular school day with a set classroom at each site and a certified teacher to oversee student progress. The classes are fully online with 23 different courses available to students in the school division through Edgenuity™. Students selected for this program are seeking either credit recovery, have previously failed the class, or credit accrual, taking the class for the first time. Improving the on-time graduation rate is a goal of offering the courses to students for credit recovery, and once they complete that course, they may continue for credit accrual, taking additional courses for the first time, once they are in the program. The teacher-developed online learning courses are offered in the summer and only in core courses including: geometry, earth science, Virginia and U.S. history, and Virginia and U.S. government. The courses are fully online with only one class meeting at the beginning of the course and a face-to-face sitting for the mid-term exam, exam and if applicable, the SOL EOC. The students take these courses for both credit recovery and credit accrual also.

Findings

Cost of Online Programs

The per-pupil costs of the Edgenuity™ online courses and the teacher-developed online course were calculated in this study to answer the first research question: What is the difference in cost per unique enrollment between a commercially available online program and a teacher-developed online program? This study used Levin and McEwan’s (2001) ingredients method to accurately calculate a per-pupil cost. The ingredients method explained by Levin and McEwan (2001) was used to establish the expenses for both the Edgenuity™ and teacher-developed online learning programs. The specific ingredients were the following: personnel, facilities, equipment and materials, other inputs, and required client inputs.
Edgenuity™ online learning program ingredients. Table 1 provides the costs associated with the Edgenuity™ online learning program for the academic years 2010-2011 and 2011-2012.

Table 1

Costs for Edgenuity® Online Learning Program, 2010-2011 and 2011-2012

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Total cost</th>
<th>Cost to school system</th>
<th>Cost to local business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>$ 1,247,212.82</td>
<td>$ 1,247,212.82</td>
<td></td>
</tr>
<tr>
<td>Facilities</td>
<td>$ 11,728.80</td>
<td></td>
<td>$ 11,728.80</td>
</tr>
<tr>
<td>Equipment and materials</td>
<td>$ 217,940.00</td>
<td>$ 217,940.00</td>
<td></td>
</tr>
<tr>
<td>Other inputs</td>
<td>$ 18,000.00</td>
<td>$ 18,000.00</td>
<td>$ 500.00</td>
</tr>
<tr>
<td>Required client inputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total costs</td>
<td>$ 1,494,881.62</td>
<td>$ 1,494,381.62</td>
<td>$ 500.00</td>
</tr>
</tbody>
</table>

Personnel. The personnel ingredient included $3,300 for the director. This figure is a percentage of the director’s time spent towards credit recovery. Although the director’s time was not specified for assistance with Edgenuity™, it was spent on work with credit recovery which utilizes Edgenuity™ and so the director’s time was included. I included $30,000, a pro-rated amount calculated by the school division, for the specialist’s salary. In this particular year, much of the specialist’s time was focused on Edgenuity™, but the data indicates that this time was expected to decrease by 30% the next year. The personnel ingredient also includes $445,877 salary for 8.5 teachers to facilitate Edgenuity™ during the school day. It is important to recognize that Edgenuity™ has licensed teachers available for online use by students at approximately $500 per student per course. The school division in this study opted to use their
own, Virginia certified, teachers. The $445,877 cost in salaries for these teachers were based on
the actual salary of each of the specific teachers used during the studied academic years, but each
one varies based on years of experience. Salaries for employees within the division also include
FICA, which is 33% of salary. This category includes the employer’s contribution to the
Virginia Retirement System (VRS) benefits and taxes. Personnel costs consisted of $3,300 x 2
years for the director, or $6,600 x 1.33 for FICA = $7980 and $30,000 for the school specialist
for the first year and $10,000 for the second, or $40,000 x 1.33 = $53,200 and $445,877 for the
teachers X 2 years, which is $891,754 x 1.33 = $1,186,032.82. The total cost for personnel is
$7,980 +53,200 +$1,186,032.82 = $1,247,212.82 for the two years of Edgenuity™ for the school
system.

Facilities. The facilities ingredient includes the classrooms used during the school day
for Edgenuity™ online courses. This school division used nine classrooms system wide. The
school division calculates the average per classroom cost for heating, cooling, and maintaining,
based on an average of a 750 sq. foot room. The cost per classroom is $3.62 per day. At this
cost per day, 9 classrooms x 180 days x $3.62 = $5,864.40 as a facilities cost. Although the cost
of maintaining classroom space would be possibly spent regardless of its use for facilitation of
Edgenuity™ classes, Levin and McEwan (2001) emphasize that all specifications must be
accounted for whether paid for by the program or not. The value of each ingredient must be
included to help realize the overall costs. The cost for facilities for the two years combined is
$5,864.40 x 2 = $11,728.80.

In this study, the school system owned the buildings used for the online programs
however, these buildings were not purchased specifically for the use of these programs. They
are owned and used regardless of the program and therefore, the depreciation costs and
undepreciated portions of the facility were not considered in this study. School systems that are implementing an online learning program and purchasing facilities will have to consider other costs associated with leasing or owning the facilities.

*Equipment and materials.* The most significant cost is for Edgenuity™ licenses. There are multiple options to choose from when contracting commercial online learning programs. The school division in this study chose concurrent licenses that allow 230 students online at any time. While the district might have more than 230 students enrolled in the school year, only 230 can be served at a time. This allows the district to maximize the licenses and encourage students to finish in a timely manner so that other students may benefit from the online course. For example, a student can enroll in an Algebra 1 class in September and finish it by December. That same student can then begin a geometry class in January and finish by June. This student will have completed two online courses but will have used only one license. The second course could also have been used by a different student and therefore two students could have gained a credit in one school year using only one license. The total expenditure for the 230 concurrent Edgenuity™ licenses for this school division was $107,870. For the 2 years together this cost is $107,870 x 2 = $215,740.

Another area in the equipment category to consider is software and technology. A media box was purchased to ensure that videos will stream system-wide without interruption. This box costs the school division $5,500 and should last at least 5 years. For the 5-year life span, the cost of the media box can be divided by five for a cost per year. For the 2 years the cost of the media box was calculated to be $5500/5 = $1,100 x 2 = $2,200.

This school system is fortunate to currently have a one-to-one laptop initiative in which all students at the high school level are issued a laptop for school use. In this case, the one-to-
one laptop initiative eliminated the cost for a student to use a computer. Computers were issued to all students in the county at the high school level regardless of their involvement in either of the online programs. Therefore, the cost of this ingredient was not necessary to be considered as a specific cost to either of the programs. The total cost for equipment and materials for the two years of the Edgenuity™ online program is the total of the cost of the licenses and the media box $215,740 + $2,200 = $217,940.

**Other inputs.** Levin and McEwan (2001) describe other inputs as things that do not fall within one of the other classifications. They give the examples of insurance and training as other inputs. The school division in this study spent $11,500 on training for the Edgenuity™ online learning program at the beginning of the 2010-2011 school year. These costs were higher due to the fact that it was year one of implementation and were reduced to $2,000 in 2011-2012. Another expense to consider for school divisions implementing an online learning program is the cost of substitutes used during training. This particular school division implemented all training during the mandatory teacher work week at the beginning of the school year. This time is set aside every year for system-wide and school based training in addition to time for teachers to prepare for the school year. Using this week allowed for the Edgenuity™ teacher facilitators to be trained without spending on substitutes. The specialist’s time that was already accounted for was used for follow up troubleshooting.

In addition to the training, other inputs would include any supplies necessary for implementation and incentives. The school system in this study spent $1,000 system-wide on additional supplies needed at each site. They also offered incentives or award programs for student progress at each site. System-wide, approximately $1,000 was spent from county funds and additional incentives in the amount of $500 were received from donations from local
businesses. The overall cost to the county was $1,000 but the estimated overall cost for incentives and awards for the program was $1,500. Other inputs included training for 2 years at a cost of $13,500 + supplies for 2 years at $1000 x 2 = $2,000 and incentives for 2 years at $1,000 x 2 = $2000. The total cost to the school system was $13,500 + $2,000 + $2,000 = $17,500 for the 2 years of implementation with an additional $500 in incentives donated from local businesses.

Required client inputs. For this particular school division, students do not pay anything towards the Edgenuity™ program. There are, however, items that schools interested in implementation of online programs must remember to include when implementing an online program. One example of a required client input is transportations costs. If a district offers a program at a site but does not offer school busses, the transportation cost is then incurred by the user. Another example of a required client input would be a fee charged to take the class. Lastly, if school systems expect students to do the online work at home, the expense on internet access at their home would also need to be considered a required client input. As previously mentioned, the school in the study has a one-to-one laptop initiative where each high school student is issued a computer to use. This cost is not included as an additional expenditure because the schools offer a computer regardless of the program a student is enrolled in, however, for a school implementing a new program, costs of the computer will either be incurred by the school, in the materials and equipment category, or by the client.

Teacher-developed online learning program ingredients. Table 2 provides the costs associated with the teacher-developed online learning program for the 2011 and 2012 summer school sessions for the school division in this study.
Table 2

*Costs for Teacher-Developed Online Learning Program, 2011 and 2012*

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Total cost</th>
<th>Cost to school system</th>
<th>Cost to students and parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>$75,086.48</td>
<td>$75,086.48</td>
<td></td>
</tr>
<tr>
<td>Facilities</td>
<td>$115.84</td>
<td>$115.84</td>
<td></td>
</tr>
<tr>
<td>Equipment and materials</td>
<td>$7,714.28</td>
<td>$7,714.28</td>
<td></td>
</tr>
<tr>
<td>Other inputs</td>
<td>$5,485.72</td>
<td>$5,485.72</td>
<td></td>
</tr>
<tr>
<td>Required client inputs</td>
<td>$11,391.60</td>
<td></td>
<td>$11,391.60</td>
</tr>
<tr>
<td>Total ingredients cost</td>
<td>$99,793.92</td>
<td>$88,402.32</td>
<td>$11,391.60</td>
</tr>
<tr>
<td>User fees</td>
<td>$-40,200.00</td>
<td>$40,200.00</td>
<td></td>
</tr>
<tr>
<td>Net costs</td>
<td>$99,793.92</td>
<td>$48,202.32</td>
<td>$51,591.60</td>
</tr>
</tbody>
</table>

**Personnel.** The personnel ingredient included $4,076 (+FICA) for each online teacher. The FICA calculation is 33% of the salary and includes Virginia Retirement System (VRS) benefits and taxes paid for by the school division. The school division in this study had three teachers for the three core subjects being evaluated. The personnel cost also includes $12,000 in administrative costs, which were estimated by the school system. The administrative costs include: registration, parent calls, technology meetings, online teacher questions, updates to the district website, monitoring course assignments, orientation meetings, checking tuition payments, staffing and reviewing grades. With the addition of FICA, the total salary and benefits for the three core teachers and summer school administrative costs are estimated to be $24,228 x 1.33 = $32,223.24 per summer session to facilitate online classes. In addition, a technology support technician is needed for technology maintenance for students taking online summer school courses. This figure was estimated by a school official to be $4,000 per summer. With the same 33% for FICA and benefits, this amount is calculated at $4,000 x 1.33 = $5,320.
The total for personnel is $32,223.24 + $5,320 = $37,543.24 x 2 = $75,086.48 for both the 2011 and 2012 summer sessions.

*Facilities.* The facilities ingredient includes the classrooms used during the summer school day for online courses. This school division does not use classroom space for summer school. However, there is an orientation meeting at the beginning of summer school, a midterm exam, a final exam, and in some courses a SOL EOC test requiring a face-to-face meeting. For the 2011 and 2012 summer school session this included four classrooms used for the testing session. The school division calculates the average per classroom cost for heating, cooling, and maintaining, based on an average of a 750 sq. foot room. At this cost per day, 4 classrooms x 4 days x $3.62 = $57.92 x2 = $115.84 as a facilities cost for both summers. As previously discussed, the buildings in this study were already owned and already in use. Calculation of cost must be included for schools purchasing or leasing space to hold online programs.

*Equipment and materials.* The most significant cost in the area of equipment and materials for the teacher-developed online courses is the development of the course. This school system developed courses in geometry, Virginia and U.S. history and Virginia and U.S. government at a cost of $9,000 each for development over a 3-year period. Although the development of the course was over 3 years, the entire cost of the course is considered because it cannot be taught until the online course is complete. However, the summer school courses have a life span of 7 years before the school system will put a large amount of money into overhauling the program, so this cost will ultimately be divided among the 7 years it is used. The three courses have a total cost of $27,000, which is then divided by 7 years to get a cost of $3857.14 per year. The total cost of program development for the 2 years of implementation was $7,714.28.
Again, the school system has a 1:1 laptop initiative in which all students at the high school level are issued a laptop for school use. Some typical expenses for implementing an online course are not necessary because of this initiative and are discussed below.

Other inputs. The other inputs involved with teacher-developed online courses would include updating and refreshing the current program. This process is similar to the development, but only includes the upkeep and maintenance to the existing program. In this school division, the teacher-developed online courses are updated annually. The school system spends an additional $1,200 annually to update the online geometry course. It also spends $1,000 on updates annually for both the online Virginia and U.S. history, and Virginia and U.S. government courses.

In addition, the school system plans on an overhaul to the existing programs to keep them up to the current state standards and refresh the programs in the next few years. This update is estimated to cost $25,000 for all of the courses combined, but is only needed every 7-10 years to maintain the current courses. The 7-10 year use of the teacher-developed program provided a solid long range investment, but it is not without additional funding needed both annually and with significant future spending to maintain standards.

This annual cost of updating and refreshing this online program was calculated for a 7-year period because that is the life of the program until another overhaul is necessary. The costs were not necessary in the developmental year, but their cost must be considered based on use over a 7-year period. The 6 years of updates are combined for all three core subjects: Geometry $1,200 x 6 = $7,200, Virginia and U.S. history $1,000 x 6 = $6,000, Virginia and U.S. government $1,000 x 6 = $6,000. The total of all three for a 7-year lifespan $7,200 + $6,000
+$6,000 = $19,200 ÷ 7 = $2,742.86 per year for program updates. The cost for both summers combined estimates other inputs at $5,485.72.

**Required client inputs.** For this particular school division, students are charged $300 per summer school course, whether online or not. Although this is not a cost of the school system, it is a cost to the client or family that needs to be considered in the total cost. Another cost that must be considered for a fully online course that is not completed at a site is Internet access. Students who took the teacher-developed online courses did not attend a brick and mortar school, which would have provided Internet access. It is the responsibility of the family to make this available. The 2012 U.S. Census results estimate that 74.8% of homes have Internet access. Since this is already available at 74.8% of homes, I calculated this cost for 25.2% of the 134 students taking online summer school courses in the three core subjects for the 2011 and 2012 summer session. Costhelper (2011) estimates the cost of Internet access to be $25 per month. The summer school program lasted 8 weeks, so the calculation is based on 2 months at $50 per student. 25.2% x 134 = 33.8 students x $50 = $1,690 for Internet access. If all homes for this population have Internet, then this cost will not be incurred, but it is important for school systems to communicate costs that are the responsibility of families.

In addition, a fully online course without any face-to-face meeting would not typically incur transportation costs. This program requires an orientation meeting, midterm exam, final exam and, if applicable, an SOL EOC test sitting. Transportation is not provided by the schools, so the families also incur this cost. The American Automobile Association (2013) estimates that the cost for a medium-sized sedan including gas, maintenance, tires, licensing and registering, insurance, taxes, and depreciation is $.78 per mile. The distance a student would have to travel was estimated using Mapquest®. The furthest school in the county to the summer school site
was found to be 18.15 miles and the shortest distance was 5.06. Using the average of these two distances, 11.61 miles is the average a student would have to travel. At a cost of $0.78 per mile, the average cost for a student to a summer school site would be $9.05 each way. The cost was multiplied by 2 for a return trip and then multiplied by 4 for the four required meetings at the school site $9.05 \times 2 = 18.10 \times 4 = $72.40$. Transportation for the four meetings both to and from the school site on average is estimated to cost $72.40 per student. This total was then multiplied by the 134 students who participated in the 2011 and 2012 summer school sessions. The total cost for transportation for the online summer school program was $9701.60. The total cost for required client inputs was a combination of transportation and Internet access was $9,701.60 + $1,690 = $11,391.60 for all 150 students. In addition, another required input, which is included as a user fee and deducted from the school systems responsibility, is the $300 summer school tuition \times 134 student or $40,200. It is important to note that this is still a cost to the program, but not the responsibility of the school system. In a cost-effectiveness analysis the total cost of the program is calculated for analysis rather than just the total cost to the school system. However, the costs for each responsible party are also itemized in the cost tables and can be utilized for when making decisions.

*Other costs to consider.* One of the most significant costs to a school division for online learning would be purchasing computers, maintaining computers, purchasing software and or web access. This particular school system has a 1:1 laptop initiative in which all students at the high school level are issued a laptop for school use. The expense of the hardware, its maintenance, and the overall infrastructure were already budgeted regardless of adopting an online learning program. This study will not include the cost of student and teacher computers, a technology specialist, Internet access or a Learning Management System (LMS) because the
school system provides these regardless of the programs being offered and when comparing these costs to other programs, they both already have this available to them. The only exception to these already available ingredients is the technology specialist needed during the summer online session because they are not typically used in the summer. However, school divisions forecasting their expected costs should be sure to include the costs of computers for teachers and students, maintenance for these computers, Internet access for the program, and an LMS for communication for the teacher-developed online program.

Analyzing Costs

The costs calculated above for Edgenuity™ were from both the 2010-2011 and 2011-2012 school years and the costs for the teacher-developed online program were from both the summer of 2011 and the summer of 2012. Using these total costs, I was able to calculate a cost per unique enrollment (see below). Unique enrollment can be defined as each instance of a student taking a single class. The calculation of cost per unique enrollment does not equate to the cost per class if a student were to enroll in Edgenuity™ or a teacher-developed program outside of this specific implementation. It is the breakdown of the total costs involved in each program, based on the ingredients specific to the program, which calculate the cost of a single unique enrollment based on the comprehensive total.

The teacher-developed online program only offered three courses during the summers of 2011 and 2012 that were also available through Edgenuity™ in the years studied. These courses were: geometry, Virginia and U.S. history, and Virginia and U.S. government. Analyzing the same courses in both programs was necessary to make a fair comparison of effectiveness. Using the cost per unique enrollment, I then calculated a total cost for only the classes that were used for comparison of effectiveness.
Cost per unique enrollment for Edgenuity™. Using the figures above, I calculated a cost per unique enrollment in the Edgenuity™ program. This allowed a calculation for the total cost of the classes that were used to evaluate the effectiveness of the programs. In 2010-2011 the Edgenuity™ online program had students enrolled in an array of courses including: algebra II, biology, chemistry, English 9, English 10, English 11, English 12, health and physical education 10, geometry, Virginia and U.S. government, Virginia and U.S. history, video and media technology, world history and geography I, and world history and geography II. The following year, in 2011-2012, there were enrollments in all the same courses with the addition of 20\textsuperscript{th} century world history, biology advanced survey of biology topics, and calculus. For comparison purposes, the only courses that were evaluated for effectiveness were those offered by both Edgenuity™ online program and the teacher-developed online program. I used the total cost for both years divided by the number of classes taken in Edgenuity™ to calculate a cost per unique enrollment and then multiplied it by the number of classes taken in the three courses that were being used in the effectiveness comparison.

\[
\text{Total cost} \div \# \text{ of classes taken} = \text{Cost per unique enrollment}
\]

\[
\$1,494,881.62 \div 1791 = \$834.66
\]

The cost per class was calculated to be $834.66 and was used to calculate the total cost for the three courses that were used to compare the two programs. The following shows the total cost of the program for the three courses being compared by both programs.

\[
\text{Cost per unique enrollment} \times \# \text{ of classes taken} = \text{Total Cost}
\]

\[
\$834.66 \times 354 = \$295,469.64
\]

The total cost for the three courses in the Edgenuity™ program was $295,469.64.
Cost per unique enrollment for the teacher-developed program. A similar breakdown of cost per unique enrollment was not necessary as a step to calculate the overall cost of the teacher-developed program since the total was derived from adding up all the costs. However, this cost would be found for discussion.

Total cost ÷ # of classes taken = Cost per unique enrollment

$99,793.92 ÷ 134 = $744.73

The cost per unique enrollment for the teacher-developed online learning program was $744.73.

The original cost calculation for the teacher-developed program was based solely on the costs for the three common courses. It included the development, course updates, and personnel for these courses only. The total cost of this program was $99,793.92.

Summary of findings for cost. The overall costs of both programs were not compared because of the difference in enrollment. The Edgenuity™ program offered a large variety of courses to 1,791 students over a 2-year period and the teacher-developed program offered three courses to 134 students in a 2-year period. The overall cost of the Edgenuity™ program was $1,494,881.62 but this is for all of the course offerings. When evaluated to compare only the same three courses including geometry, Virginia and U.S. history, and Virginia and U.S. government, the cost of the Edgenuity™ online program was $295,469.64 serving 354 students and the teacher-developed online program was $99,793.92 for 134 students. The results from the first research question revealed that the Edgenuity™ course costs were an estimated $834.66 per class offered and the teacher-developed online course cost $744.73 per course offered. The difference in the cost of a single course in the two programs is $89.93, with the teacher-developed program being the least costly per course option.
**Effectiveness of Online Programs**

The effectiveness of the Edgenuity™ online courses and the teacher developed online course were evaluated in this study to answer the second research question: What is the difference in the effectiveness of the Edgenuity™ online courses and the teacher developed online courses based on passing the class and passing the SOL EOC? Effectiveness in this study was measured in two ways: the number of students who successfully passed the online courses taken and the number of students who successfully passed the SOL EOC test taken. Modeling the methods used by Levin and McEwan (2001), this study used passing the class and passing the associated test as the units of effectiveness because they clearly demonstrate the goal of the school system. They are both requirements for graduation and define a successful program.

For the purpose of this study, to compare effectiveness, the data has been filtered to include only courses that were utilized by both programs. The common courses included: geometry, Virginia and U.S. history, and Virginia and U.S. government. All three of the courses were evaluated for effectiveness based on students passing the course, but only the geometry and Virginia & U.S. history classes were evaluated for effectiveness based on the SOL EOC test because the Virginia and U.S. government course does not have an ensuing SOL EOC test.

**Edgenuity™ online learning program effectiveness.** In 2010-2011 the Edgenuity™ data included 705 high school students who took at least one course in the Edgenuity™ program. There were 80 high school students who took more than one course for a total of 796 classes taken in the 2010-2011 school year. In the 2011-2012 academic year, 879 high school students took at least one course through Edgenuity™. There were 89 students who took more than one course, which totaled to be 995 courses taken through Edgenuity™ system-wide in 2011-2012. The total number of courses taken in Edgenuity™ was 1,791 in all subjects offered; however, for
the measure of effectiveness these courses were filtered to only include geometry, Virginia and U.S. history, and Virginia and U.S. government.

Table 3 displays the total number of classes and SOL tests both taken and passed by students enrolled in the select courses through Edgenuity™ for the 2010-2011 and 2011-2012 academic years.

Table 3  
**Edgenuity™ Course and SOL Results, 2010-2011 and 2011-2012**

<table>
<thead>
<tr>
<th>Course</th>
<th>No. of classes taken</th>
<th>No. of classes passed</th>
<th>No. of EOC SOL tests taken</th>
<th>No. of EOC SOL tests passed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometry</td>
<td>93</td>
<td>77</td>
<td>52</td>
<td>11</td>
</tr>
<tr>
<td>VA &amp; U.S. history</td>
<td>26</td>
<td>24</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>VA &amp; U.S. government</td>
<td>235</td>
<td>229</td>
<td>n/a*</td>
<td>n/a*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>354</strong></td>
<td><strong>330</strong></td>
<td><strong>78</strong></td>
<td><strong>35</strong></td>
</tr>
</tbody>
</table>

*N/a indicates that there is no EOC SOL test for VA & U.S. Government.

The effectiveness of the Edgenuity® program can be evaluated based on the percent of students who passed the class taken and the percent of students who passed the SOL test associated with the class. Figures 1-3 display the percentages of students who passed a course taken through Edgenuity®. Figures 4 and 5 display the percentages of students who passed an SOL EOC test after a completed a course in Edgenuity®.
Figure 1. Edgenuity™ geometry course effectiveness.

Figure 2. Edgenuity™ Virginia and U.S. history course effectiveness.
Figure 3. Edgenuity™ Virginia and U.S. government course effectiveness.

Figure 4. Edgenuity™ geometry SOL EOC effectiveness
Teacher-developed online learning program effectiveness. In the summer of 2011, 83 students took teacher-developed online classes system-wide. In the summer of 2012, this number was 72 students. Table 4 displays the total number of classes and SOL tests both taken and passed by students enrolled in the select courses through the teacher-developed program for the summers of 2011 and 2012.

Table 4

*Teacher-Developed Course and SOL Results, 2011 and 2012*

<table>
<thead>
<tr>
<th>Course</th>
<th>No. of classes taken</th>
<th>No. of classes passed</th>
<th>No. of EOC SOL tests taken</th>
<th>No. of EOC SOL tests passed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometry</td>
<td>21</td>
<td>15</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>VA &amp; U.S. history</td>
<td>47</td>
<td>42</td>
<td>43</td>
<td>37</td>
</tr>
<tr>
<td>VA &amp; U.S. government</td>
<td>66</td>
<td>54</td>
<td>n/a*</td>
<td>n/a*</td>
</tr>
<tr>
<td>Total</td>
<td>134</td>
<td>111</td>
<td>61</td>
<td>49</td>
</tr>
</tbody>
</table>

*N/a indicates that there is no EOC SOL test for VA & U.S. government.
Figures 6-8 display the percentages of students who passed a course taken from the teacher-developed online program. Figures 9 and 10 display the percentages of students who passed an SOL EOC test after a completed teacher-developed online course. It is important to note the category of “withdrew from class” in the following figures. I included these students in the total numbers for taking the class, which has an effect on the pass rate.

![Teacher-developed Geometry Course Results](image)

*Figure 6. Teacher-developed geometry course effectiveness.*
Figure 7. Teacher-developed Virginia and U.S. history course effectiveness.

Figure 8. Teacher-developed Virginia and U.S. government course effectiveness.
Figure 9. Teacher-developed geometry SOL EOC effectiveness.

Figure 10. Teacher-developed Virginia and U.S. history SOL EOC effectiveness.
Effectiveness summary of findings. There are clear differences in the pass rates across courses, so the findings are separated by courses. Figure 11 shows the comparison of the course pass rates between the Edgenuity™ and teacher-developed programs. The Edgenuity® had a higher pass rate compared to the teacher-developed program in each of the three courses that were evaluated. In addition, the overall pass rates of the three courses combined was 93.2% pass rate for the Edgenuity™ program and an 82.8% overall pass rate for the teacher-developed program indicating that with respect to passing the course, the Edgenuity™ program is more effective.

Figure 12 shows the comparison of the EOC SOL pass rates for the two common courses that have an ensuing end-of-course test. The pass rates on the EOC SOL tests revealed an inconsistency among the courses across both programs. The Edgenuity™ program had a higher pass rate.
Figure 12. Comparison of the SOL pass rates.

pass rate for the Virginia and U.S. history course than the teacher-developed program, but a lower EOC SOL pass rate in geometry. The overall SOL test pass rates for the Edgenuity™ and teacher-developed programs were 44.9% and 80.3%, respectively. On the geometry SOL, the teacher-developed program exceeded the Edgenuity™ pass rates by 45.5% and this differential resulted in a higher overall SOL pass rate for the teacher-developed program than the Edgenuity™ program.

It is also important to point out that the percentage of students who withdrew from each of the programs without finishing is higher in the teacher-developed program. The Edgenuity™ had a total of 354 students taking the three courses being compared and had 15 students (4.2%) withdraw before finishing the class. The teacher-developed program had 12 students withdraw out of the 134 (9%) who took the three courses.

Cost-Effectiveness Analysis

A cost-effectiveness analysis of the Edgenuity™ online courses and the teacher developed online course was implemented in this study to answer the third research question:
Which online learning program, Edgenuity™ or teacher developed, is better in terms of both cost and effectiveness? The final step in a cost-effectiveness analysis is to calculate a cost-effectiveness ratio for each of the alternatives (Levin & McEwan, 2001). The calculation of the cost-effectiveness ratio (CER) is the Cost (R) divided by its effectiveness (E) and can be described as “the cost required to obtain a single unit of effectiveness” (Levin & McEwan, 2001, p. 135).

\[
CER = \frac{C}{E}
\]

For this research, the first cost-effectiveness ratio describes the cost for a single student to pass an online course and the second cost-effectiveness ratio describes the cost for a student to pass the SOL test associated with the online course taken.

Table 5 displays the calculation of the CER for both the Edgenuity™ and teacher-developed program based on passing the course. I applied Levin and McEwan’s cost-effectiveness-analysis and can describe this ratio as the cost for one student to pass a class in the given program. The cost for a single student to pass a course in the Edgenuity™ program is estimated to be $895.36 per student and the same cost in the teacher-developed program is estimated at $899.04 per student.

<table>
<thead>
<tr>
<th>Program</th>
<th>Cost of program</th>
<th>Effectiveness no. students passed</th>
<th>Cost-effectiveness ratio (CER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edgenuity™</td>
<td>$ 295,469.64</td>
<td>330</td>
<td>$ 895.36</td>
</tr>
<tr>
<td>Teacher-developed</td>
<td>$ 99,793.92</td>
<td>111</td>
<td>$ 899.04</td>
</tr>
</tbody>
</table>
Table 6 shows the calculation for the CER based on passing the associated EOC SOL test in both the Edgenuity™ and teacher-developed program. I describe this ratio as the cost for one student to pass the SOL test associated with the online course. The cost of the programs was once again adjusted to eliminate the cost of the Virginia and U.S. Government courses that do not have an associated SOL test. The cost per unique enrollment in each program was multiplied by the total number of students taking the SOL test to calculate the total cost associated with the students taking an SOL test. The total cost for the students taking the SOL tests in Edgenuity™ was $834.66 x 78 = $65,103.48 and the same cost in the teacher-developed program was $744.73 x 61 = $45,428.53. The CER based on the effectiveness measure of passing the SOL EOC test in the Edgenuity™ program is estimated to be $1,860.10 per student and this same cost in the teacher-developed program is estimated at $927.11 per student.

Table 6

<table>
<thead>
<tr>
<th>Program</th>
<th>Cost of program</th>
<th>Effectiveness no. students passed</th>
<th>Cost-effectiveness ratio (CER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edgenuity™</td>
<td>$65,103.48</td>
<td>35</td>
<td>$1,860.10</td>
</tr>
<tr>
<td>Teacher-developed</td>
<td>$45,428.53</td>
<td>49</td>
<td>$927.11</td>
</tr>
</tbody>
</table>

Summary of Findings

This study compared two online learning programs by conducting a cost-effectiveness analysis. The overall cost of the Edgenuity™ program was much higher than the overall cost of the teacher-developed program but the Edgenuity™ program enrolled students in 1,791 classes compared to the 134 enrollments in the teacher-developed program. A comparison of the cost
per unique enrollment revealed a lower cost in the teacher-developed program at $744.73, compared to the Edgenuity™ program which was $899.04.

The effectiveness of each program was first evaluated independent of the costs and considered only the three common courses offered by both programs. The Edgenuity™ program had a total of 330 courses passed in geometry, Virginia and U.S. history and Virginia and U.S. government and the teacher-developed program had 111 courses passed in the same three courses. Once again, the discrepancy in these numbers is considerable due to the much greater enrollments in the Edgenuity™ program. When the passed courses were examined as a rate, based on the total number of course attempted, the overall pass rate for the Edgenuity™ program was 93.2% and the respective rate for the teacher-developed program was 82.8%. In addition, the Edgenuity™ program had a higher pass rate in each of the three courses offered.

The effectiveness was also evaluated, exclusive of cost, for the results of the SOL EOC test. The results were limited to courses with an associated test, which was only geometry and Virginia and U.S. history. The Edgenuity™ program had a total of 35 students pass the test in both courses combined and the teacher-developed program had a total of 49 students pass the test. The overall pass percentages based on the number of student who took the tests showed a 44.9% pass rate in Edgenuity™ compared to 80.3% in the teacher-developed program. Broken down by course, the Edgenuity™ had a 53.8% pass rate in geometry and a 92.3% pass rate in Virginia and U.S. history compared the teacher-developed courses which had a 66.7% and 86.0% pass rate, respectively. With the exception of the geometry SOL test, the Edgenuity™ program had a higher pass rate in all other categories than the teacher-developed program.

The results of the cost-effectiveness analysis revealed a lower cost-effectiveness ratio in the Edgenuity™ program than the teacher-developed program for the effectiveness measure of
passing the course. The cost-effectiveness ratio for the criteria of passing the course was under $900 for both programs with a difference of $89.93. Contrary to passing the course, the effectiveness measure of passing the associated SOL test showed the teacher-developed program with a lower cost-effectiveness ratio. The cost-effectiveness ratio for passing the SOL test was $1,860.10 for the Edgenuity™ program and $927.11 for the teacher-developed program. The difference between the two was considerable with the Edgenuity® program costing $932.99 more for each SOL test passed. In summary, the study reveals that the Edgenuity® program had a higher overall pass rate and a slightly lower cost-effectiveness ratio with respect to passing the course, but a higher cost per unique enrollment and higher cost-effectiveness ratio with respect to passing the SOL test.
CHAPTER 5. DISCUSSION AND CONCLUSIONS

The purpose of this study was to implement a cost-effectiveness analysis of two K-12 online learning programs. The results can be used by school systems to examine ways in which to make decisions by balancing cost and effectiveness. This study was guided by the following questions:

1. What is the difference in cost per unique enrollment between the Edgenuity™ online courses and the teacher developed online courses?

2. What is the difference in the effectiveness of the Edgenuity™ online courses and the teacher developed online courses based on passing the class and passing the Standard of Learning (SOL) End-of-Course Test (EOC)?

3. Which online learning program, Edgenuity™ or teacher developed, is better in terms of both cost and effectiveness?

Research surrounding K-12 online learning has been limited, and yet as school systems swiftly move forward with the implementation of online learning programs to offer students, information to make the best choices is necessary. Whether a school system is keeping up with new trends, following state legislative requirements or suggestions, offering classes that otherwise would not be available, or offering courses for credit recovery, it is the responsibility of the school leaders to make decisions that optimize both cost and effectiveness when choosing a program for their students.
In this chapter, I summarize the findings of this research, offer recommendations for the school division of interest and other divisions, discuss the limitations of the research, and present suggestions for future research. The decision to implement online learning programs has become a choice which is easy to support when considering the associated benefits that the programs have to offer. These include, but are not limited to, meeting the needs of specific groups of students; offering courses not otherwise available; offering Advanced Placement or college-level courses; permitting students who failed a course to take it again; reducing scheduling conflicts for students (Picciano & Seaman, 2010). However, there are numerous online learning program options from which a school system can choose. Consideration must be given to the option that best meets the academic goals of the school system, while also weighing the cost of achieving these same goals.

**Summary of Findings**

The total cost for implementing the Edgenuity™ program at the school system studied was $1,494,881.62 and the teacher-developed program totaled $99,793.92. A cost worksheet and the ingredients method were used to determine cost components for both programs. The itemization, as well as the total, proved meaningful as it gave a well-defined picture of the elements necessary to implement either program system-wide. Regardless of the program, the largest cost ingredient, by far, was personnel. The Edgenuity™ online course had a total of 1,791 classes taken over a 2-year period, which calculates to a cost per unique enrollment of $834.66. The teacher-developed online program had a total of 134 students, also for 2 years of the program, and a cost of $744.73 per unique enrollment.

The effectiveness of the programs was measured using data from the three common courses offered by both online programs. The two units of effectiveness, analyzed
independently, were a pass in the course taken and a pass on the associated SOL test. The overall course pass rates were 93.2% for the Edgenuity™ program, and an 82.8% for the teacher-developed program and the overall SOL pass rates were 44.9% and 80.3%, respectively. The Edgenuity™ program had a total of 15(4%) withdrawals out of the 354 students enrolled in the three courses examined while the teacher-developed program had 12(9%) withdrawals out of 134 students.

The final calculation of this cost-effectiveness analysis was the cost-effectiveness ratio (CER), which can be described as the cost to achieve a single unit of effectiveness (Levin & McEwan, 2001). The cost to achieve a pass in a course for the Edgenuity™ program was $895.36, and the CER for a pass in a course for the teacher-developed online program was $899.04. Furthermore, the CER for a pass on the SOL test for the Edgenuity™ program was approximately $1,860.10 for a single SOL test pass, and the CER for the teacher-developed program was $927.11 for a single SOL test pass.

Conclusions

The detailed costs in Chapter 4 were used to calculate the cost-effectiveness ratio, but more importantly they provided an understanding of the ingredients required for the implementation of an online program. Although the Edgenuity™ program has a lower CER for a passed course than the teacher-developed program, the difference in the CERs was only $3.68. The uncertainty in the research and estimation in calculations makes this difference negligible, and I conclude that at the class level the CER is essentially the same. The significance of the approximately equal CER at the class level identifies the importance of the ingredients involved in the design of each of the programs. An understanding of the details and components involved in the implementation are the real value of the research and will allow the school division studied
to evaluate and improve the current use of ingredients to achieve a higher cost-effectiveness ratio with either or both programs.

The cost-effectiveness ratio for the Edgenuity™ program is approximately $1,860.10 for a single pass on the SOL test and the same ratio for the teacher-developed program is $927.11. There is a big difference in the cost for a pass on the SOL test between the two programs and both costs are high overall. Further scrutiny to explain these high costs revealed that the Edgenuity™ SOL pass rate in Virginia and U.S. history was 92.3% and in the teacher-developed program it was 86%, while the geometry pass rates were 21.1% and 66.7%, respectively. Once again the needs and goals of the school system should be the driving factor in choice of programs. If the SOL test is a necessity for course credit and a component of graduation requirements, the Edgenuity™ program is costly to obtain this particular goal. In addition, the low pass rates and high cost are not meeting the goals of the school division nor meeting the needs of students trying to graduate. Success in passing the geometry course is achieved at a high overall rate, but the SOL test pass rate is not sufficient in either program, and I assume that the geometry rates are driving the costs-effectiveness ratio up for both programs. Questions can be raised pertaining to the alignment of both courses to the state standards since the course pass rate is so much higher and achieved at a lower cost than the SOL pass rate. A more careful evaluation of the quality of the alignment of the commercial online program course to the state standards is necessary before relying on the program to meet the needs of the school division.

One of the most valuable benefits of the Edgenuity™ program is that the curriculum is already developed and students have the option of more than 60 courses to choose from. A school can have a classroom of 30 students taking 30 different courses. The school division in this study enrolled students in 17 different courses through Edgenuity™. This allowed them the
option to have one student enrolled in a course but only pay for the calculated $834.66 per course rather than pay the cost to develop the curriculum for an online course, which was approximately $9,000. The goals of the school and the reason for implementation of online learning are the most important factors to consider. If it is to offer a variety of courses, a commercial vendor would provide a wider range of courses for a lower cost per unique enrollment. The school division in this research took advantage of using 17 different courses from Edgenuity™ and served 1,791 students, but always had the option of an additional course offering if necessary to meet the needs of a student.

The total overall cost of the Edgenuity™ program was much greater than that of the teacher-developed online program. The school system in this study opted to offer the Edgenuity™ online program during the school day rather than allow students to work from home and this came at a great expense. The majority of the costs for the program were allocated to the use of teachers as facilitators and the use of the school building. Although some costs were avoided by this implementation: transportation, computers, Internet access, and access to technology specialists, they did not offset the high personnel costs. However, the Edgenuity™ program enrolled more than 10 times the number of students as the teacher-developed program. The school system in this study made use of the concurrent licenses from Edgenuity™ and were able to offer a total of 1,791 classes over the 2 years at the expense of only 460 licenses. This use of concurrent licenses was the primary reason Edgenuity™, the overall more costly program, resulted in a competitive cost-effectiveness ratio and I suggest the use of concurrent licenses, during the school day, with an “on-site” teacher.

The teacher-developed program is a cost-effective option for school systems to consider when implementing an online learning program. Although the costs for development of a course
are only feasible if the number of students taking the course is of a significant size, a valuable benefit is the ability of the school system to control the costs for development and to ensure alignment with state standards and what is currently taught in the school system. The school division controlled how much they contributed to the development on an annual basis, the number of students they enrolled, and the fee charged to offset costs. The teacher-developed program had control over changes to the program and alignment with the state standards to meet the goals of the school system. Unfortunately, the ability to offer a wide variety of courses to students would require the development of a new online course for each class needed, and development of a course for a limited number of students would be unreasonable. This makes the ability to meet the need of all students costly. Increasing the number of students taking the teacher-developed program would be a way to lower both the cost per unique enrollment and the cost-effectiveness ratio. Once the needs of the school system are evaluated and the number of students being served is calculated, decisions can be made on the appropriate program. It is also important to consider the option, for schools, to enroll students from outside the system at a fee to offset some of the costs.

The data on student withdrawal from courses in the online setting is also important to examine and analyze. The Edgenuity™ program had a 4% rate of withdrawal and the teacher-developed program had a 9% rate of withdrawal. It is reasonable to assume there will be some withdrawals, but the more than double rate in the teacher-developed program urges evaluation to identify areas of modification in the program design. The 15 withdrawals in the Edgenuity™ program were funds spent for no output. These funds cost the school system 15 x $834.66 = $12,519.90 and the 12 withdrawals in the teacher-developed program cost 12 x $744.73 = $8,936.76 for no passed class or passed test. The effect of withdrawals equate to costs with no
output and a higher CER in the two programs. I determine the variations in ingredients and design to be the contributors to the lower withdrawal rate for the Edgenuity™ program. In particular, the on-site teacher facilitators, who can provide support for student progress, and the implementation during the school day, support the successful completion of the courses. Both of these ingredients come at a high cost to the school system, but may offset the CER through an increase in the pass rate. Programs targeting students taking classes for accrual are less likely to need the additional support of the teacher facilitators and will continue to find success with a program similar to the teacher-developed summer school program, whereas students enrolled for credit recovery will need the support offered in the school setting.

Recommendations

Levin and McEwan (2001) explain that the reason for a cost-effectiveness analysis is “to provide a method for choosing among alternatives in order to select those that are able to accomplish a given result most parsimoniously” (p.1). The findings on cost and effectiveness are useful to compare the two online learning programs, but the cost-effectiveness analysis further pinpoints the amount of money required to accomplish the specific goals of the school system. Unfortunately, cost-effectiveness analyses are rarely done in educational settings because the outcomes are practical and contribute to the decision-making process. Levin and McEwan (2001) state that:

Cost effectiveness-analysis should be the topic of concern because it can lead to a more efficient use of educational resources-it can reduce the costs of reaching particular objectives, and it can expand what can be accomplished for any particular budget or other resource constraint. (p. 6)
**Implications for the School Division of Interest**

The cost-effectiveness ratio for the measurement of passing the course was essentially the same for the two online programs and, therefore, I believe that the two programs evaluated are both valuable, but with two different purposes. A program implemented during the school day, with teacher facilitators, will best support students for credit recovery who are seeking courses for graduation. The summer school program, without an on-site teacher, will meet the needs of the students seeking accrual who do not have room in their schedule to add a class during the academic year and do not require additional support. For other school divisions embarking on implementation, the details in implementation must be the driving force behind the decision making, not only for which type of program to use, but exactly how to implement it.

The school division studied incurred a large expense added to the cost of the Edgenuity™ program for on-site certified teachers. Using teachers from the online company is one way to possibly save money and avoid higher salaries because of FICA, but the on-site teachers, during the normal school day, contributed to the school system’s ability to take full advantage of the 460 licenses. Students taking these courses at home, without a facilitator, may be less motivated or less focused, whereas at school with an on-site teacher, students may be more accountable for their progress. The on-site teacher provided the school system with the organization necessary to keep students progressing at an appropriate pace and new students continuing to enroll to make the best use of the licenses and, in turn, save the program money. I am not convinced that the success of the program is due to the certified characteristic of the teacher or because they are on-site. The on-site characteristic is easily supported above to save money through organization and support to use concurrent licenses, but why do the facilitators need to be certified? Are they helping the students with the content? There are a variety of ways that the school system would
be able to save money: use less experienced teachers who earn less on the pay scale, use teachers for the courses that need additional content support, or use noncertified facilitators with the ability to motivate and organize but earn less money. Using on-site teachers comes at a large expense and is worth the cost if the effect is students completing courses successfully and concurrent licenses used efficiently. However, there is still room to improve the design and save money.

I recommend that the school division ensure that the enrollment is high enough to rationalize the cost of a teacher. If the number of students at a particular school, within the division, is lower than other schools, this teacher complement may be wasted and driving up the cost of the program for only a small numbers of students. The design within the division can also vary among the individual schools based on their needs. In some cases, the use of the teachers can be modified to be only part of their responsibilities, or the use of the company’s teacher at $500 per course may be less costly than the cost of a classroom teacher. The average annual salary for a teacher used in the Edgenuity™ program for the school system of interest was $52,456 + FICA which, divided by the number of students, would be the cost per student and can be easily calculated for decision making. In addition, consideration needs to be given to which teachers are chosen for these positions based on salary, experience, subject taught, and level of assistance they can give students.

One of the program design details that helped lower the cost per unique enrollment, and in turn the cost-effectiveness ratio for the Edgenuity™ program, was offering the courses during the school day and at no expense to the student. This design is a successful way to attract students to participate in an online program: It is convenient and an option for all students regardless of socioeconomic status. In addition, the ability to pass a course and begin a new one
all within one class period during the school day because students work at their own pace, is extremely valuable to a student who has previously failed a course and is seeking on-time graduation as well as the student who is seeking credit accrual for flexibility in their schedule. There is less accountability for the student and family to provide consistent Internet access away from school and supports the school systems on-time graduation rate.

The teacher-developed program design for the school system in the study is open to scrutiny because of the required client inputs and offering the courses during the summer. Charging students to take online courses can affect the attractiveness or limit the access of the program to students with limited economic means. If the school system can offer the program during the summer without charging a fee, the system will meet the needs of a higher number of students. The school system would benefit from cost efficiency if a larger number of students enrolled in the summer school offering of the teacher-developed program. However, it is negligent to assume that increasing this number is even possible. The summer session is offered to all students who fail a class or would like to get ahead, and these are the actual numbers that took advantage of it in the summer of 2011 and 2012. I conclude that taking a course during the normal school year is more attractive and feasible to students based on the number of students enrolled in the Edgenuity™ program compared to the teacher-developed summer program. If the school system’s intention is to meet the needs of students seeking credit recovery during the summer, I recommend that they eliminate the fee to expand the opportunity to all students regardless of economic status. As designed, the teacher-developed summer program currently meets the need of a group of students taking courses for accrual who do not have room in their schedules for additional courses during the school year. I do not recommend the summer
program be eliminated but rather that it is offered without a fee to encourage increased participation.

I recommend that school leaders not only consider cost, but thoughtfully reflect on the needs of the school system when making a choice among online learning programs. The total cost is not the only comparison that should be made. In this study, the Edgenuity™ had a much larger variety of courses to offer, which if offered in the teacher-developed program would increase the costs for program development. If the needs of the school system require a variety of courses, with some courses only enrolling a small number of students, a teacher-developed program may not be a cost-effective scenario when a commercially available program has the variety already created at a set price. It is, however, an option to create a teacher-developed program and offer it to other school systems for a fee. I recommend that the school system of interest, if faced with financial constraints for online learning, consider this as a viable option.

An important recommendation would be to improve the alignment of the geometry online course or to discontinue its availability as an online option. Without further evaluation as to why students are less successful in that course, specific changes are unable to be made. In addition, I recommend that the school system make a change to use a certified math teacher as the facilitator for students taking online geometry. As discussed previously, the use of a certified teacher as the facilitator is ideal, but only if the student can take advantage of the opportunity of additional support in the content area when needed, otherwise, the certified teacher is futile. It is clear that the geometry course stands out as a difficult course to take in the online format and, therefore, I suggest additional support from a teacher with content knowledge. The school system needs to evaluate its needs and discontinue use of certified teachers as facilitators if the teachers are only used for organization and motivation.
I have provided a way to make decisions by weighing choices against each other based upon cost and effectiveness. However, sometimes there are factors beyond cost and effectiveness that must be considered. For instance, building the capacity of the current staff has long-term benefits on the value added effects of teachers. Using and improving the skills of the faculty in the school through development of teacher-developed online courses and online teaching can contribute to their overall capacity. This practice would be a great alternative to supplement to the Edgenuity™ program which has a low success rate with student passing the geometry SOL test.

In summary, I recommend that the school system of interest continue using both of the programs as they are, but with some of the modifications suggested. It is obvious, based on continued enrollments, that both programs are utilized by students and necessary to meet a variety of needs. The design of the summer program is more attractive to a student taking courses for accrual whereas the Edgenuity™ program is more likely to be the alternative for students seeking credit recovery. After a detailed cost-effectiveness analysis, many specifics were revealed that can be used to modify the program to obtain a lower cost-effectiveness ratio. The many successes in the study reveal overall online use as a benefit to students and the school system by assisting students in graduating on time or offering other students options for flexibility in scheduling.

**Implications for Other School Divisions**

In an attempt to contribute to the decision-making process for schools choosing among the alternatives of online learning programs, the use of a cost-effectiveness analysis “can lead to a more efficient use of educational resources” and it “can expand what can be accomplished for any particular budget” (Levin and McEwan, 2001, p. 6). The results of this study are only
generalizable to the school division of interest, but following are recommendations, based on the results of this study, for school systems evaluating their current online learning program or those that are initiating an online program and are faced with the choosing a program among the many alternatives.

The cost-effectiveness analysis in this study determined that there was essentially no difference in the cost-effectiveness ratio, at the course level, between the Edgenuity™ online learning program and the home-grown, teacher-developed online program at a suburban Virginia school system. The information obtained from this study that I believe will be the most practical for leaders was the inventory of ingredients and the expected costs involved with implementing an online program. The process is achievable, and the information provided in the cost worksheets and calculations will guide leaders to meet the needs of their school system.

The almost no difference between the cost-effectiveness ratios for passing the class emphasizes the importance of the details in the program design. It also places value on the use of this study as a model for future implementation. The identification of ingredients, assigning each with a cost, and the careful calculations for an accurate estimate of the cost of each program are useful for other school systems attempting to estimate costs up front or in an evaluation of their own program. For leaders deciding whether to use teachers to facilitate, or how many to use for the implementation of the program, this model demonstrates how to calculate these personnel costs including FICA and benefits. In addition, consideration of the costs incurred by families is important for clear communication of financial expectations for students enrolling in the course. Lastly, use of this model by leaders with a fixed budget will contribute to an accurate calculation of costs when faced with making a choice among ingredients due to budget constraints.
The method of implementation of the Edgenuity™ program was appealing to students for a number of reasons, which in turn, lowers the overall cost-effectiveness ratio because of the increased number of students enrolled and the number of courses passed. Students did not have to pay a course fee, they took the course during their regularly scheduled school day, they were able to take more than one course in the school year if they finished one, and they had access to an on-site teacher. A school system looking to charge a fee for the online program to save in costs may find that the result is low enrollment because students do not want to or are unable to pay. Offering online courses during the school day is convenient and supports students’ efforts to recover failed courses without having to attend in the summer. Also, students who finished a course for credit recovery had the opportunity to move on and attempt additional credits within the school year, both encouraging recovery and on-time graduation. Encouraging students in credit-recovery also supports the school system to maintain their on-time graduation rate. The school division in the study allocated the majority of the spending on the Edgenuity™ program to the personnel ingredient. The use of on-site teachers provided support and encouragement to the students as well as management, which maximized the number of students enrolled in courses throughout the year and kept the cost-effectiveness ratio down. These features of an online program combined are recommended to school systems implementing online programs because they are ways to increase student enrollment and effectiveness which lowers the cost-effectiveness ratio.

With respect to costs, I recommend that schools leaders evaluate all the purchasing options that commercially available programs have to offer. The use of concurrent licenses was a cost saver for the Edgenuity™ program at the school system studied and allowed the system to maximize the number of courses taken and lower the cost-effectiveness ratio. The use of a
commercial program with concurrent licenses is cost-effective and worthy of being emulated however, a school system trying to meet the needs of a very small number of students may find the Edgenuity™ program less cost-effective. For small school divisions, it is necessary to ensure they can operate in this manner and take advantage of using a license by multiple students, otherwise costs will be much higher.

Offering a teacher-developed program can be a cost-effective provided that certain aspects are evaluated. The first recommendation to schools choosing to implement a teacher-developed online learning program would be to verify that expert teachers are available to appropriately develop courses in line with the goals of the school and state standards. Next, I recommend a thorough evaluation of the school system’s needs as to not carelessly spend money to develop courses that only a limited number of students will take, thus increasing the cost per unique enrollment. The last recommendation is to specify the appropriate clients for the courses and keep the program design in line with what is attractive and feasible to the client, especially in regard to client-required inputs and the ability to contribute financially.

As a modification to the design of the teacher-developed program in this research, I recommend a closer look at costs to evaluate whether having an on-site teacher is possible. This availability will support and encourage students to finish the course, which would decrease the number of withdrawals, and costs may be offset by this saving. However, if the teacher-developed program is similar to the one in this research and offered in the summer, salary is not the only additional cost to consider if implementing an on-site teacher to this design. A building site for meeting and transportation to the site will be incurred costs that must be taken into account.
A suggestion to school systems implementing online learning programs would be to make sure that the course is accurately aligned to the state standards, which the EOC test is designed around. Also, at that point, an evaluation can determine the support that students need in each course to better prepare them for the EOC test. For example, success in the geometry course is achieved at a high overall rate, but the SOL test pass rate is not sufficient enough in either program, and it can be reasonably assumed that the geometry rates are driving the cost-effectiveness ratio up. I recommend that courses with lower SOL pass rates receive higher levels of support or are not taken online. It would also be valuable, in cases where the course success rate is not satisfactory, to decide whether that course SOL test is necessary for graduation or course credit. If the geometry SOL was not needed for graduation, then offering the course without the SOL test may still meet the goals of the school or student. Courses that have a lower online success rate should be re-evaluated to improve the alignment to the standards and perhaps should be eliminated as an online option.

The information on student withdrawal from courses in the online setting is also important to consider when implementing an online learning program. The last recommendation for the design of a program is to attempt to keep the number of withdrawals as low as possible. The Edgenuity™ rate of withdrawal was lower than the teacher-developed program and it is important to pinpoint how these rates, which equate to lost funds, are achieved. I credit the offering of the course during the school day and the on-site teacher facilitators who encourage student progress to the lower withdrawal rate. Both of these ingredients came at a high cost to the school system, but were somewhat offset by reducing the number of withdrawals. This adds to the factors that need to be considered by decision makers because cutting costs by eliminating on-site teacher support may lead to a higher withdrawal rate, which in turn, costs the school
money. I recommend that programs for credit-recovery employ the on-site teacher to encourage completion but these teachers should be chosen using the recommendations stated earlier to keep the costs down and make the best use of the teacher.

Consideration must also be given to whether these courses are designed for credit recovery or credit accrual. If the goal of the school system is to encourage on time graduation, it is in the best interest of the school to make the courses attractive and feasible to all students. Both the incurred cost and offering the course in the summer may affect the attractiveness of the program to students in need of credit recovery. Along these same lines, offering courses at a fee may be something to consider if the goal of the school system is to offer courses to students looking for credit accrual above and beyond the normal expectations.

The school system in this study began offering both online programs prior to the legislation requiring an online course for graduation in Virginia. According to a Governor McDonnell spokesperson, Jeff Caldwell, in an email to Emma Brown at the Washington Post, the purpose of the legislation was to prepare students for the “job market of the 21st century” (Brown, 2012, p. 1). The design of the Edgenuity™ program does not necessarily meet the aim of preparing students for independent online learning because the course is held in a classroom with the teacher present. Leaders implementing online courses to meet the legislative requirements will want to offer a program that allows students to take online classes with the goal of gaining experience online in the 21st century.

Overall, for any program design, I recommend that the school systems first consider their clients, the students, particularly pertaining to the socioeconomic status of the students whose needs they are trying to meet. Some programs seem ideal, but the required client costs may put
an online course out of reach for some students. If the school system can offer the program without charging a fee, the system will meet the needs of a higher number of students.

Although it is cost-effective for schools to charge a fee for students to take online courses, this is not recommended for implementation of these online programs. The program in this study that charged a fee and was teacher-developed, enrolled approximately one-third the number of students than the Edgenuity™ program in the three subjects compared. It is the decision of the school leader to weigh the costs, but if the program is to encourage on time graduation, the school system needs to consider lessening the barriers that might prevent students from taking online courses. It would be beneficial to offer it during the school day, in the regular school year, without a fee, provide computers and transportation, and offer support to encourage more students to enroll in an online learning program.

It is important to note that the one-to-one laptop initiative for the school system of interest eliminated some challenges that schools may face when implementing online options. Both the Edgenuity™ and the teacher-developed programs benefit from the laptop initiative but even more, offering a program during the school day decreases any problems with student access to online courses and eliminates the required cost of Internet service as an additional cost to students when taking online courses. School systems implementing online programs without the one-to-one initiative will face deviations to the costs outlined above with either program.

**Suggestions for Future Research**

There are very few cost-effectiveness studies in education and yet decisions on costs, budgets, and expenditures are required of leaders. Additional cost-effectiveness studies for other program implementations would further support this body of research. The Virginia Department of Education website lists 19 multidistrict online providers approved for use in the state and
these do not include home-grown, single-district programs. It seems likely that many types of programs are used and that these programs vary in program design and implementation. Cost-effectiveness analysis in addition to an overall program evaluation would support this research and increase the knowledge of the effectiveness of online learning in Virginia, which will also inform leaders and guide decision making.

Research on the characteristics of the students who are most likely to be successful in an online setting will contribute to the process of implementing a successful online program. The ability to identify students who are likely to be successful in an online learning setting will keep the cost-effectiveness ratio lower. Identifying the characteristics of students who will likely be successful in an online learning setting will also assist the school system in achieving goals and meet the needs of the students. This identification will eliminate wasting money from the school and time from the student in a program that possibly was not aligned to the best learning environment for the student.

Only slightly different from this, but also useful, would be research specific to the reason for the student taking the course. Not only could different characteristics of students affect their success in an online program, but the reason they are taking the course may also have an influence on their success and the success of a program. For instance, credit recovery is identified as a reason students enroll in credit-recovery programs. Research both on the success of credit recovery students in online learning and also its effect on the on-time graduation rates of a school would be of interest.

Research which identifies the courses that are the most likely for students to master and, conversely, those that are the most difficult to pass in the online setting will also be valuable to the future of online learning. These areas of research will help school leaders make better, more
cost efficient choices when initiating an online program. These decisions are important and have an effect on multiple student outcomes including student success or pass rates, higher on-time graduation rates, and lower student drop-out rates.

Another suggestion for research is to employ a cost-effectiveness analysis on two programs that are taught during the school day or two programs taught in the summer. The differences in the implementation of the two programs examined in this study may have contributed to some of the differences in cost or effectiveness. The comparison of these two types of implementation in the same setting may produce different results.

The last detail of the design needing additional research pertains to the effect of an on-site teacher on the success of a student taking an online course. The most costly ingredient in this study, for both of the two online programs, was personnel. Quantitative studies comparing the use of an on-site teacher as a facilitator compared to the use of a virtual teacher would offer insight into whether these costs were worth the expense. In addition, qualitative studies capturing the views of students with and without an on-site teacher would also be of great value when evaluating the necessity of the costly practice of using an on-site teacher. Additionally, research comparing the effect on student achievement of an unlicensed facilitator to a certified teacher, both on-site, will contribute to identifying cost saving options for implementation.

Further research in this area will assist decision makers with program development and contribute to the goal of keeping costs down while providing an effective online program. In addition, after analyzing the data from this school system, questions arose whether the teacher facilitator played the same role at each site and whether the success rates were consistent. This school system would be a good setting for future research on comparing the role of the teacher in the online classroom.
Limitations of the Study

The results from this study are, unfortunately, specific to the particular school system of interest and would not be generalizable to other schools. The one-to-one laptop initiative allowed this division to undertake the execution of two online learning programs with ease and this made the calculations of cost simpler. Although distinct, the cost-effectiveness research of this study outlines the costs necessary for execution of an online program and can be used as a tool to assist decision makers in the adoption of their own online program and meets the needs of their own student population. In addition, this study outlines the design of implementation of the programs used and can be emulated with modifications to meet the specifics of another school system.

The cost-effectiveness analysis in the research was not a comparison of all possible implementations of Edgenuity™ with all teacher-developed online programs, but only one distinct way these programs were implemented. Many of the program design details contribute to the overall functionality, but these details are open to modification as you can see in these two different applications of online learning. It is beneficial for leaders to implement programs to best fit the needs and meet the goals of their schools. This study provided two examples of online learning programs and the cost-effectiveness analysis of each, which visibly outlines the required components and their cost. These examples can be used as a guide to decision makers to design an online learning program or modify and existing program that appropriately and affordably achieves the objectives of the school.

My intention when beginning this research was to break down the data further to distribute the effects of the two online programs among credit recovery and credit accrual students. My understanding of the programs was that they both had a combination of students
taking classes for each of these reasons and I felt that the comparison of the two programs would offer more insight into which program was most cost-effective for students taking classes for both of these reasons. It would have also had a huge impact on the decisions for those schools considering implementation because they could better tailor the program for their specific needs. Unfortunately, the data from the school system did not identify students as taking the class for recovery or for the first time and so the research was limited to the results with students taking classes for each of these reasons together. This research has stimulated questions and driven the need for more additional research in the area of cost-effectiveness and online learning.

I expected this research to successfully answer the research questions and leave no doubt as to which online program is more cost-effective for K-12 learning in this school system, while also creating a model for other school systems to use. Although the results of the cost-effectiveness analysis for passing the SOL revealed a clear program of choice, the cost-effectiveness analysis for students passing an online course was essentially the same. It was the details in the program design that offered the most insight. These specifics gave the school system in this study a closer look at the variations within each program and helped to identify areas to modify and improve the programs. At the same time, the identification of the elements necessary to minimize the cost-effectiveness ratio of these programs provide other school systems with a model to use for implementation of a successful online program.
LIST OF REFERENCES
LIST OF REFERENCES


Appendix A
Cost Gathering Worksheet
Teacher-Developed Online Courses

Please fill out the following tables to provide information on the costs associated with implementing the teacher developed online courses in your school division.

Program Costs

This section of the cost worksheet requires information related to the cost of developing and implementing the teacher developed online courses.

1) What was the total number of students enrolled in the teacher developed online courses at all high schools for the 2011 summer school session?

2) What was the total number of teacher developed courses offered and taken during the 2011 summer school session?

3) Are teachers paid a stipend or rate, other than their compensation for teaching the course, for developing the online courses for the summer school session? If yes, what is the rate of stipend?

4) Are there any other costs associated when developing teacher made online courses for summer session? If yes, please explain and give a price for these other services.

5) Are the stipends or extra pay for development of courses offered annually or when new courses are designed? Please explain in detail.
Technology

This section of the cost worksheet requires information related to any additional needs required for the teacher developed summer session online course implementation. This includes software and network costs needed only for these online courses, including those subsequently acquired by your school division and used in other areas.

6) Please use this table to list the cost of learning management systems or software expenses used in conjunction with summer session online courses purchased by your school division (for example: school space, blackboard, video streaming, conferencing tools, secured environments, etc.):

<table>
<thead>
<tr>
<th>LMS/Software</th>
<th>Costs (put a * if cost is per license)</th>
<th>Check if purchased for summer online courses specifically</th>
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</thead>
<tbody>
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<tr>
<td>Total</td>
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</tbody>
</table>

7) Please use this table to list the cost of any network, website, or maintenance costs needed for implementation of any of the summer session online courses (for example: increased bandwidth, new interface, additional technical support, technology for compatibility, etc.):

<table>
<thead>
<tr>
<th>Technology Maintenance</th>
<th>Costs (put a * if cost is per license)</th>
<th>Check if purchased for summer online courses specifically</th>
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</thead>
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<tr>
<td>Total</td>
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</tbody>
</table>

8) Are there any miscellaneous costs in this area?

If yes, please list the item with an explanation and a cost for each.

<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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<tbody>
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</tbody>
</table>
Personnel

This section of the cost worksheet requires information related to the costs of the personnel required for the teacher developed online course implementation. This includes central office staff, instructors or facilitators, and any other employees with job responsibilities related to the implementation of the teacher developed online courses offered in the 2011 summer session.

9) Please use this table to list the number of central office staff with responsibilities related to management of the 2011 summer school session for teacher developed online course program implementation. The responsibilities of this person would include but is not limited to: assistance in getting started; completion of paperwork for compensation; general overseeing; generates reports; distributes materials, liaison between faculty and technology support personnel. Please report the category of compensation (salary, wage or stipend) in addition to an estimate (in percent) of the work responsibility that is devoted to the implementation of the teacher developed online summer school courses.

<table>
<thead>
<tr>
<th>Central Office Staff</th>
<th>Type of pay</th>
<th>online summer session</th>
<th>Compensation</th>
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</thead>
<tbody>
<tr>
<td>Employee #1</td>
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<td>Employee #2</td>
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<td><strong>Total</strong></td>
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</tbody>
</table>

10) Please use this table to list the number of instructors/facilitators used for each school or each course offered and the salary paid.

<table>
<thead>
<tr>
<th>Instructional Staff</th>
<th>Type of pay</th>
<th>online summer session</th>
<th>Compensation</th>
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<tbody>
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<td>Employee #1</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>
11) Do any of the instructors/facilitators have other responsibilities which are part of compensation and would need to be subtracted to isolate the costs for the implementation of the summer session online course?

If yes, please use this table to explain.

<table>
<thead>
<tr>
<th>Instructional Staff</th>
<th>Other paid duties</th>
<th>% of job devoted to other duties</th>
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</thead>
<tbody>
<tr>
<td>Employee #1</td>
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<td>Total</td>
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</table>

12) Are there additional staff members or miscellaneous costs necessary in this area?

If yes, please list the item with an explanation and a cost for each.

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<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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</table>

**Training/Staff Development**

This section of the cost worksheet requires information related to the initial and ongoing training or staff development of those involved in the implementation of teacher developed online courses. The implementation of a new online program often requires instructor/facilitator training. This is sometimes done multiple times throughout the year and the costs associated with
the training are to pay substitutes, pay trainers, pay attendees, and provide food and drinks. Please answer the following questions related to staff development and training for teacher developed online courses instructors and facilitators.

13) Is training or staff development used in conjunction with the summer session online courses?

If yes, please complete the information below to estimate the costs associated with providing training to the instructors/facilitators.

\[
\text{Number of employees trained} \times \text{Cost of substitute} \times \# \text{ of training days} = \text{Cost}
\]

\[
\text{Number of employees trained} \times \text{Stipend for employees} \times \# \text{ of training days} = \text{Cost}
\]

Payment to leader of staff development

14) Are there any miscellaneous costs in this area?

If yes, please list the item with and explanation and a cost for each.

<table>
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<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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Facilities and Equipment

This section of the cost worksheet requires information related to the use of facilities and equipment required for the teacher developed online course implementation.

15) Does your school division have a cost per classroom calculation?

If yes, what is the cost per classroom used?
16) What is the total number of classrooms being used at all the high schools for the implementation of teacher developed online courses during the summer session?

Additional equipment other than a computer and a classroom are often needed by instructors. This can include electronic equipment, headphones, paper, printing supplies, and clerical supplies.

17) Is there a budget for supplies allocated to online summer session instructors, or money made available?

If yes, how much total for all schools?

18) Are there any miscellaneous costs in this area?

If yes, please list the item with and explanation and a cost for each.

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<tr>
<th>Item</th>
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Student Costs

This section of the cost worksheet requires information related to the costs that students pay for the online course implementation. Any revenue generated through tuition charged for the program can be subtracted from the costs to your school division.

19) Are students charged tuition or fees for taking online courses through the online summer session?

If yes, what are the charges per student? Please list all charges and explain how they are charged.
<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost/Per student</th>
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20) Are there any miscellaneous costs in this area?

If yes, please list the item with an explanation and a cost for each.

<table>
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<th>Item</th>
<th>Explanation</th>
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</table>

**Miscellaneous**

Are there any other cost categories not included in this cost worksheet that should be considered when calculating the costs of the teacher developed online courses?

If yes, please explain.

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________
Appendix B
Cost Gathering Worksheet
Edgenuity Online Courses

Please fill out the following tables to provide information on the costs associated with implementing the Edgenuity programs in your school division.

Program Costs

This section of the cost worksheet requires information related to the cost of purchasing the online program Edgenuity.

1) What was the total number of students enrolled in Edgenuity at all high schools for the 2010-2011 school year?

2) What was the total number of courses taken using Edgenuity at all high schools for the 2010-2011 school year?

3) Is Edgenuity purchased by licenses, flat fee, courses taken or another method?

4) Are there any other costs associated when purchasing programs from Edgenuity? __________ If yes, please explain and give a price for these other services.________________________

5) What was the total purchase price for Edgenuity during the 2010-2011 school year?

6) Please give a brief description of how this cost is calculated.

________________________

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Technology

This section of the cost worksheet requires information related to any additional needs required for the Edgenuity online course implementation. This includes software and network costs needed only for Edgenuity including those subsequently acquired by HCPS and used in other areas.

7) Please use this table to list the cost of other learning management systems or software expenses used in conjunction with Edgenuity purchased by your school division (for example: school space, blackboard, video streaming, conferencing tools, secured environments, etc.):

<table>
<thead>
<tr>
<th>LMS or Software</th>
<th>Costs (put a * if cost is per license)</th>
<th>Check if purchased for Edgenuity specifically</th>
</tr>
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<tr>
<td>Total</td>
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</tbody>
</table>

8) Please use this table to list the cost of any network, website, or maintenance costs needed for implementation of Edgenuity (for example: increased bandwidth, new interface, additional technical support, technology for compatibility, etc.):

<table>
<thead>
<tr>
<th>Technology Maintenance specifically</th>
<th>Costs (put a * if cost is per license)</th>
<th>Check if purchased for Edgenuity</th>
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<tr>
<td>Total</td>
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</tbody>
</table>

9) Are there any miscellaneous costs in this area?

If yes, please list the item with and explanation and a cost for each.

<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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</table>
 Personnel

This section of the cost worksheet requires information related to the costs of the personnel required for the Edgenuity online course implementation. This includes central office staff, instructors or facilitators, and any other employees with job responsibilities related to Edgenuity implementation.

10) Please use this table to list the number of central office staff with responsibilities related to management of the Edgenuity online course program implementation. The responsibilities of this person would include but is not limited to: assistance in getting started; completion of paperwork for compensation; general overseeing; generates reports; distributes materials, liaison between faculty and technology support personnel. Please report the category of compensation (salary, wage or stipend) in addition to an estimate (in percent) of the work responsibility that is devoted to Edgenuity for each employee.

<table>
<thead>
<tr>
<th>Central Office Staff Compensation</th>
<th>Type of pay</th>
<th>% of job related to Edgenuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee #1</td>
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<td>Employee #2</td>
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<td>Employee #5</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

11) Please use this table to list the number of instructors/facilitators used for each school and the salary paid.

<table>
<thead>
<tr>
<th>Instructional Staff Compensation</th>
<th>Type of pay</th>
<th>% of job related to Edgenuity</th>
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<tbody>
<tr>
<td>Employee #1</td>
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<td>Employee #12</td>
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<tr>
<td>Employee #13</td>
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</tbody>
</table>
12) Do any of the instructors/facilitators have other responsibilities which are part of compensation and would need to be subtracted to isolate the costs for Edgenuity alone?

If yes, please use this table to explain.

<table>
<thead>
<tr>
<th>Instructional Staff</th>
<th>Other paid duties</th>
<th>% of job devoted to other duties</th>
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<tbody>
<tr>
<td>Employee #1</td>
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<td>Employee #2</td>
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<td>Employee #4</td>
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<td>Employee #13</td>
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<td>Employee #14</td>
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<tr>
<td>Employee #15</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

13) Are there any additional staff members used or miscellaneous costs in this area?

If yes, please list the item with and explanation and a cost for each.

<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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</thead>
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</table>

Training/Staff Development
This section of the cost worksheet requires information related to the initial and ongoing training or staff development of those involved in the implementation of Edgenuity. The implementation of a new online program often requires instructor/facilitator training. This is sometimes done multiple times throughout the year and the costs associated with the training are to pay substitutes, pay trainers, pay attendees, and provide food and drinks. Please answer the following questions related to staff development and training for Edgenuity instructors and facilitators.

14) Is training or staff development used in conjunction with the Edgenuity program?

If yes, please complete the information below to estimate the costs associated with providing training to the Edgenuity instructors/facilitators.

Number of employees trained  x  Cost of substitute  x  # of training days = Cost

_______________________  x  _______________  x  ____________  =  __________

Number of employees trained  x  Stipend for employees  x  # of training days = Cost

_______________________  x  _______________  x  ____________  =  __________

Payment to leader of staff development

__________________

15) Are there any miscellaneous costs in this area?

If yes, please list the item with an explanation and a cost for each.

<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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**Facilities and Equipment**

This section of the cost worksheet requires information related to the use of facilities and equipment required for the Edgenuity online course implementation.

16) Does your school system have a cost per classroom calculation?
If yes, what is the cost per classroom used?

17) What is the total number of classrooms being used at all the high schools for the implementation of Edgenuity?

_______________________________

Additional equipment other than a computer and a classroom are often needed by instructors/facilitators. This can include electronic equipment, headphones, paper, printing supplies, and clerical supplies.

18) Is there a budget allocated to Edgenuity facilitators, or money made available?

_______________________________

If yes, how much total for all schools?

_______________________________

19) Are there any miscellaneous costs in this area?

_______________________________

If yes, please list the item with and explanation and a cost for each.

<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost</th>
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Student Costs

This section of the cost worksheet requires information related to the costs that students pay for the Edgenuity online course implementation. Any revenue generated through tuition charged for the Edgenuity program can be subtracted from the costs to your school division.

20) Are students charged tuition or fees for taking online courses through the Edgenuity program?

_______________________________

If yes, what are the charges per student? Please list all charges and explain how they are charged.
21) Are there any miscellaneous costs in this area?

If yes, please list the item with an explanation and a cost for each.

<table>
<thead>
<tr>
<th>Item</th>
<th>Explanation</th>
<th>Cost/Per student</th>
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<tbody>
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**Miscellaneous**

Are there any other cost categories not included in this cost worksheet that should be considered when calculating the costs of the Edgenuity online courses?

If yes, please explain.

__________________________

______________________________________________________________________________

______________________________________________________________________________

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______________________________________________________________________________
Appendix C

Research Subject Information and Permission/Request Form

Susan Proffitt
Research for Dissertation
VCU Ph.D. Educational Leadership

Study Title: “Commercially Available or Home-Grown? A Cost-effectiveness Analysis of K-12 Online Courses”

Investigator: Susan Proffitt

Background and Purpose: As part of my dissertation for the completion of my Ph.D. in Educational Leadership at Virginia Commonwealth University, I am employing a cost-effectiveness analysis comparing Edgenuity® online courses to teacher developed online courses. The information requested in this cost worksheet will help to determine the actual expense of both types of courses and contribute to the accuracy of my report. You are being asked to take part in this research project by answering the questions on the following cost worksheet to help provide me with information on the costs associated with two types of online programs offered in your school division. The information requested will assist leaders in decision making about the types of online courses to offer.

Procedures: Please fill out the attached cost worksheet to the best of your knowledge and return to Susan Proffitt @ proffits@vcu.edu. Any questions that do not pertain to your implementation of online courses may be skipped. Please indicate on the worksheet any questions that you do not know an accurate answer to.

Confidentiality: All responses and individuals will remain confidential and the results will be provided to your school division.

Request for More Information: If you have any questions, please feel free to call me at (804)741-0562 or email me at proffits@vcu.edu. Thank you for your time.

Signature: I confirm that the purpose of the research and the procedures are understood. My participation is voluntary, and I do not need to answer all questions. I understand that my responses and identity will be confidential.

Name of Respondent: __________________________________________________________

Position of Respondent: _______________________________________________________
Susan Proffitt was born January 12, 1971 in Bethpage, NY. She graduated from the University of Richmond in 1993 with a B.A. in Mathematics and a concentration in Secondary Education. She taught high school mathematics in Chesterfield County, VA for 10 years where she coached track, boys’ volleyball, and girls’ basketball. She was also the mathematics department chair and an administrative aide. Susan received a M.Ed. in Administration and Supervision from Virginia Commonwealth University in 2002. After 7 years home with her children, she is currently a mathematics teacher at John Randolph Tucker High School in Henrico County, VA.