A Research Question and Study of the Impact of Khan Academy on Standardized, SAT Reading, and Writing and Language Pre-Test Scores in Alternative Education

Michael J. Ketelaar

Aquinas College

Faculty Mentor

Dr. Carol Winkle

Second Mentor

Mr. Rick Hatfield

Master Teaching Project
Submitted to School of Education at Aquinas College in partial fulfillment of the requirements for the degree of Master in the Art of Teaching

5/2/17
Abstract

The achievement gap has been researched for years, and this gap continues to become an issue of concern due to the importance and gravity of standardized testing in America. How to motivate and increase standardized test scores of students who have gaps in their education and a history of low, academic prowess has been the topic of many Professional Learning Community discussions, keynote presentation topics, government legislation, and academic texts. Lynn (2006) stated that great disparities in educational achievement have gone through a number of theoretical and empirical examinations. Taylor and Graham (2007) shared that poor testing performance and underachievement among low-income, minority groups compared to high-class, Caucasians is a well-documented and pervasive problem in American public schools today.

With a new version of the Scholastic Aptitude Test (SAT) and shift from the American College Testing (ACT), even high affluent districts are scrambling to make changes to accommodate this switch, so their students continue to be successful, and their schools recognized for high levels of academic achievement on standardized tests. Interestingly, the new SAT and the pressures that come with it may only further the achievement gap for struggling learners and schools because the testing organizations are not adequately taking demographic and cultural differences into meaningful consideration when creating these assessments. Kim and Sunderman (2005) highlighted that despite years of concerted efforts, a significant disparity in student test scores remain between African Americans, and low-income students and their white and economically advantaged peers. Closing the achievement gap on standardized assessments is viewed as the most significant educational challenge facing American society in the 21st century. In fact, Sum and Fogg (1991) found that poor students rank in the 19th percentile on standardized assessments while students from a mid-upper income family rank in the 66th percentile on standardized assessments. What changes will happen in schools and classrooms accustomed to less than favorable standardized test scores and already disengaged students? What must a teacher in an alternative setting do in order to meet the needs of
students with educational gaps, so they can be successful on standardized testing? These were questions pondered by this researcher before the start of this study.

The researcher came across Khan Academy, a website with tutorial videos, which prepare students for material on the SAT. This site was launched in 2006 by educator, Salman Khan, with the goal of allowing equal, educational access to all regardless of race, culture, or socio-economic status. Intrigued that using Khan Academy videos could remedy the achievement gap, the researcher opted to test if implementing this resource would alleviate the achievement gap and increase English/Language Arts (ELA) students’ Reading, and Writing and Language Practice-Test, SAT Scores.

The participants in this project were twelve, 10th grade, ELA students at an alternative high school representing an extremely, diverse district. The teacher, as researcher, tested if showing students 44 Khan Academy videos in class (videos instructing students how to answer questions on the Reading, and Writing and Language portion of the SAT), would impact students’ scores between their Pre-Test, Practice SAT scores, and Post-Test, Practice SAT scores taken in class. Once pre-testing, showing 44 videos, and post-testing occurred, the researcher used Pearson’s Correlation Formula to analyze the strength of correlational relationship to determine if the videos actually helped increase students’ scores.

Pearson’s Correlation Formula showed that a strong, positive correlation occurred because of using Khan Academy. The results of the SAT Reading Practice Test yielded a correlation of .89 while the SAT Writing and Language Practice Test yielded a correlation of .86. The scores of all participants increased from their Pre-Test to Post-Test. On average, participants scored increased by 12%.
# Table of Contents

Abstract ........................................................................................................................................... 2

Chapter 1: The Problem .................................................................................................................. 5

Introduction .................................................................................................................................... 5

Purpose of Study ............................................................................................................................... 6
  Justification of the Study ................................................................................................................. 6
  Research Hypothesis ....................................................................................................................... 6
  Definition of Terms ......................................................................................................................... 7

Chapter 2 - Background and Review of Literature ....................................................................... 11

Chapter 3 - Procedures .................................................................................................................... 14
  Description of the Research Design ............................................................................................... 14
  Description of Sample .................................................................................................................. 15
  Description of the Instruments Used ............................................................................................ 15
  Description of the Specific Procedures ....................................................................................... 15

Chapter 4 – Results, Analysis, and Data ......................................................................................... 18

Chapter 5 – Discussion and Conclusions ....................................................................................... 26

References ...................................................................................................................................... 28

Appendices .................................................................................................................................... 31
Chapter 1: The Problem

Introduction

This researcher began his educational career teaching English/Language Arts (ELA) in a private, Catholic high school, where academic rigor and college preparation drove curriculum and pedagogy. Students earned high grades and excelled at standardized testing, allowing most to attend colleges they desired as well as earn substantial scholarships. The majority of students came from middle to upper class backgrounds where academic success was expected and achievement gap was a foreign concept. After a few years in this setting however, this researcher’s career changed drastically, shifting to teaching ELA in an alternative high school known for their diversity, low, socio-economic status, and below average standardized test scores.

This shift in educational setting caused the writer to encounter the reality of achievement gap when it comes to students of low, socio-economic standing, particularly that of minority students. While the alternative setting thrived on building positive relationships and meeting students’ unique learning styles in order to recovery credits and graduate, very little was being done, in the researcher’s opinion, to bridge the achievement gap these students faced on standardized testing. Unwilling to settle for this gap, the researcher began researching methods and curriculums, which could help non-traditional learners increase their competency on standardized testing and improve their college admittance possibilities.

After several years of searching for an engaging and effective solution to this gap, the researcher came across Khan Academy and wondered if this could be the remedy to level the playing field and diminish the achievement gap on standardized testing for alternative students with low, socio-economic status.

Problem

Students from low, socio-economic standing, particularly minority students, suffer from achievement gap when it comes to standardized test scores. As educators, we must find a solution to this gap in order to meet the diverse learning needs of all students, even non-traditional learners in an alternative setting.
Purpose of the Study

The purpose of this study was to find solutions for the achievement gap (Scholastic Aptitude Test Reading, and Writing and Language Pre-Test/Post Test Scores) in secondary ELA classes with low, socioeconomic status students. The research sought to find a panacea to enhance the curriculum in a secondary, ELA classroom with the hope of improving scores on the Reading, and Writing and Language portion of the SAT. In turn, the achievement gap diminishes and Reading, and Writing and Language Practice Post-Test scores increase. The research wanted to know if curriculum change (implementation of Khan Academy), would improve students’ SAT Practice-Test scores who are historically low, achieving students suffering from achievement gap. This study sought to find a solution to decrease this achievement gap and help low, achieving students make academic strides on the SAT.

Justification of the Study

The justification was change must happen. We can no longer ignore the achievement gap that plagues poverty-stricken students in America. Standardized testing is not going away, and educators need to embrace this stark truth. Educators, who serve low achieving, poverty-stricken students, must make drastic changes in their curriculum and pedagogy to lessen this gap and alter this perpetual cycle of inadequacy. If change occurs, students in America would not only receive free education, but an education that can bring about academic achievement for all students regardless of socio-economic status. This study served to see if the use of Khan Academy was the change in curriculum, which could improve scores using Pearson’s Correlation Formula to determine the impact the videos upon Reading, and Writing and Language Practice-Test scores.

Research Hypothesis

Khan Academy will improve reading, writing, and language scores.

In this study, the independent variable was test scores while the dependent variable was Khan Academy tutorial videos.
Definition of Terms

**Achievement Gap:**

Constitutive Definition: According to Lee (2006) achievement gap occurs when one group of students (such as, students grouped by race/ethnicity, gender) outperforms another group and the difference in average scores for the two groups is statistically significant (that is, larger than the margin of error).

Operational Definition: In this study, “achievement gap” referred to low, socio-economic standing (SES) students’ achieving lower Scholastic Aptitude Test; English/Language Arts scores compared to middle and high SES students.

**Alternative Education:**

Constitutive Definition: According to Sable, Plotts, and Mitchell (2010), alternative education, at the federal level, is defined as a “a public elementary/secondary school that addresses needs of students that typically cannot be met in a regular school, provides nontraditional education, serves as an adjunct to a regular school, or falls outside the categories of regular, special, or vocational education.”

Operational Definition: In this study, alternative education referred to the researcher’s particular school that addresses the needs of student that regular, traditional schools cannot meet and provides non-traditional education.

**Dependent Variable:**

Constitutive Definition: According to NCSU.edu, “A dependent variable is what you measure in the experiment and what is affected during the experiment. The dependent variable responds to the independent variable. It is called dependent because it "depends" on the independent variable.

Operational Definition: In this study, dependent variable referred to the Khan Academy videos.
**Independent Variable:**

Constitutive Definition: According to NCSU.edu, “an independent variable is the variable you have control over, what you can choose and manipulate. It is usually what you think will affect the dependent variable.

Operational Definition: In this study, the independent variable referred to the SAT, Practice Test scores.

**Khan Academy:**

Constitutive Definition: According to www.khanacademy.org, “Khan Academy is a non-profit educational organization created in 2006 by educator Salman Khan with a goal of creating an accessible place for people to be educated. The organization produces short lectures in the form of YouTube videos.”

Operational Definition: In this study, Khan Academy referred to this websites, but specifically, the 44, tutorial videos providing instruction of material students will encounter in the Reading, and Writing and Language sections on the Scholastic Aptitude Test (found in the appendix).
**SAT Reading Test:**

Constitutive Definition: According to the College Board, “the SAT Reading test is a 65 minute test in which students must read 5 different passages and respond to 52 multiple choice questions. The passages fall into different categories such as: classic or contemporary work of U.S. or World Literature, one passage from a U.S. founding document, a passage about economics, psychology, or sociology, and two science passages that examine the foundational concepts and developments in Earth science, biology, chemistry, or physics. Within these five passages, the test challenges students to do the following: find evidence in a passage that best supports the answer to a previous question or serves as the basis for a reasonable conclusion, identify how authors use evidence to support their claims, find a relationships between an informational graphic and the passage it’s paired with, use context clues in a passage to figure out which meaning of a word or phrase is being used, and decide how an author’s word choice shapes meaning, style and tone” (www.collegereadiness.collegeboard.org).

Operational Definition: In this study, SAT Reading Test referred to the Pre/Post, Practice SAT Reading Test distributed by the researcher to subjects. Specifically, this test is: Reading Practice Test 1. (Found in the appendix).

**SAT Writing and Language Test:**

Constitutive Definition: According to the College Board “The SAT Writing and Language test is a 35 minute test in which students read passages and make corrections to 44 multiple choice questions. This test measures a wide range of skills and concepts such as: command of evidence, words in context, analysis in history, social studies, and science, expression of ideas, and standard English conventions.” (www.collegereadiness.collegeboard.org).

Operational Definition: In this study, SAT Writing and Language Test referred to the Pre/Post, Practice SAT Writing and Language Test distributed by the researcher to subjects. Specifically, this test is: Writing and Language Practice Test 2. (Found in the appendix).
Scholastic Aptitude Test (SAT):

Constitutive Definition: According to Webster’s Dictionary, the SAT is defined as “a set of standardized college admission tests developed by the College Board, the principal one measuring mathematical and verbal reasoning, and others measuring knowledge in specific subject areas.”

Operational Definition: In this study, SAT will referred to the latter constitutive definition. If “practice” preludes SAT, this is referring to the practice, Pre/Post-tests distributed to students.

Socioeconomic Status:

Constitutive Definition: According to the American Psychology Association, “socioeconomic status is commonly conceptualized as the social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation.”

Operational Definition: In this study, socioeconomic status referred to the above constitutive definition. If “low” preludes socioeconomic status, this refers to students who struggle due to a lack of resources and gaps in their education.
Chapter 2-Background and Review of Literature

Background

The achievement gap has been highly researched, and it remains a prevalent topic of discussion and concern in public education in America. In fact, Taylor and Graham (2007) explained that poor testing performance and underachievement among low-income, minority groups compared to high-class, Caucasians is a well-documented and pervasive problem in American public schools today. Clearly, a problem exists with the need for remedy. Lynn (2006) further stated that great disparities in educational achievement have gone through a number of theoretical and empirical examinations. How to motivate and increase standardized test scores of students who have gaps in their education and a history of low, academic prowess has been the topic of many Professional Learning Community discussions, keynote presentation topics, government legislation, and academic texts. Clark (2001) explained that closing this gap is one of the most critical issues facing public education in America today. It is the key to achieving goals educational reform sweeping this country. In fact, our nation’s economy, fellowship, and societal cohesion depend on all children being well-educated regardless of socio-economic status. Kim and Sunderman (2005) shared that despite years of concerted efforts, a significant disparity in student test scores remains between African Americans, and low-income students and their white and economically advantaged peers. Closing the achievement gap on standardized assessments is the most significant educational challenge facing American society today.

According to Gustafson (2002), standardized testing does not serve students of low, socioeconomic backgrounds because they lack rich, life experiences that provide a foundation for learning in which they can acquire specific standards-based facts. In fact, Sum and Fogg (1991) found that poor students rank in the 19th percentile on standardized assessments while students from a mid-upper income family rank in the 66th percentile on standardized assessments. Gustafson (2002) offered hope however, defending educators can however implement meaningful pedagogy making learning comprehensive, interesting, and successful and in turn combat the rigidity and lack of success standardized-based learning fosters.
With a new version of the Scholastic Aptitude Test and shift from the American College Test, even high affluent districts are scrambling to make changes to accommodate this transition so their students continue to be successful, and their schools recognized for high levels of academic achievement on standardized tests. Interestingly, the new SAT and the pressures that come with it may only further the achievement gap for struggling learners and schools because the testing organizations are not adequately taking demographic and cultural differences into meaningful consideration when creating these assessments. Rowly and Wright (2011) explained that, discrimination based on race in the public school setting, as well as family factors outside the school setting, contribute to this difference in test scores. According to the National Commission on Excellence in Education (1983) students in America who do not possess the levels of skills and literacy essential to his new era will be effectively disenfranchised, not simply by the material rewards that go along with competent performance, but also the change in participate fully an informed citizen.

The purpose of this study was to see if solutions exists for the achievement gap (SAT Reading, Writing and Language scores) in secondary ELA classes with low, socioeconomic students. The research hoped to find ways to improve scores on the Reading, and Writing and Language portion of the SAT. Nettles, Millett, and Ready (2003) noted that a full standard of deviation exists between low-socioeconomic, minority students and white performance on the SAT. Nettles, Millet, and Ready (2003 also claimed that changing curricula offered by schools is perhaps the easiest intervention. Edmonds (1979), Flaxman (2003), and Hancock (2001) agreed, claiming that many researchers asserts that diminishing the achievement gap requires high expectations for student achievement brought about my rigorous and engaging curriculum aligned directly to the assessment. Hence, the research was conducted to see if curriculum change (intense focus on SAT skills through implementing Khan Academy) would improve students’ SAT scores who are historically low, achieving students suffering from achievement gap. The justification of this project was change must happen. Educators can no longer ignore the achievement gap that plagues poverty-stricken students in America. Cooper (2011) explained that we run the risk that many students will end up being
nominally proficient, but still lacking the education needed to be successful on highly competitive planet focused on success and excellence. Moreover, Nettle, Millet, and Ready (2003) shared that a plethora of theories explain the perpetual, lower academic performance of African American students...changing curricula offered by schools is perhaps the easiest intervention and most immediate intervention.

One educationist, Sal Khan, created a possible solution to alleviate the achievement gap facing students of minority and low, economic-status. According to PR Newswire (2016) Khan Academy, a leader in online education, developed world-class preparation for everyone, regardless of race and socio-economic status to prepare for the new SAT and increase their changes of college admittance. PR Newswire (2016) also wrote that these interactive practice tools are designed to help level the playing field for students who are interested in taking the SAT and preparing for college-level courses. Unlike traditional, high-priced test prep that focuses on strategies for taking the test and quick cramming, Official SAT Practice supports and reinforces what students are learning in classrooms by helping them focus on the knowledge and skills most essential for college readiness. Diamond (2007) noted that while differences in instruction contribute to educational inequality, the current emphasis on standardized testing, and rigorous instructional content emphasizes exposing all children to the kind of instruction once reserved for the social and economic elite. Khan Academy seeks to be this means of exposure to bridge the prior disparity of access to quality instruction, particularly instruction directly related to high-stakes testing.
Chapter 3-Procedures

After reviewing literature addressing the achievement gap, its reality and impact, and the need for solutions to this problem as well what these solutions might be, the researcher/teacher found Khan Academy as an effective medium to decrease the achievement gap of low, socio-economic students on standardized testing.

Description of the Research Design

This study used quasi-experimental research in which the teacher was also the researcher. This research method, using Pearson’s Correlational Formula to assess strength of correlation, would determine if Khan Academy, specifically the Reading, and Writing and Language, SAT, Tutorial videos, helped bridge the achievement gap for low, socio-economic students in alternative education. In this study, the independent variable was the SAT, Practice test scores while the dependent variable was the Khan Academy tutorial videos.

The purpose of this study was to find solutions for the achievement gap (SAT Reading, and Writing and Language Practice-Test Scores) in secondary ELA classes with low, socioeconomic status students. The research sought to find a panacea to enhance the curriculum in a secondary ELA classroom with the hope of improving scores on the Reading, and Writing and Language portion of the SAT. In turn, the achievement gap diminishes and Practice-Test scores increase. The researcher wanted to know if curriculum change (implementation of Khan Academy), would improve students’ SAT Practice-Test scores who are historically low, achieving students suffering from achievement gap. This study sought to find a solution to decrease this achievement gap and help low, achieving students make academic strides on the SAT.
Description of Sample

The participants in this research study were male and female students from an English 10B class at Crossroads Alternative High School in Kentwood, MI. Students were between the ages of 14-17 years old. Of the 12 student participants, 80 percent were African American and 20 percent were Caucasian. All students were At-Risk students on Free and Reduced Lunch.

Description of the Instruments Used

The instruments used included the Reading, and Writing and Language SAT, Pre/Post Practice Tests found on the College Board website. The Reading Practice Pre/Post Test were 52 multiple-choice questions (Reading Practice Test 2 found in appendix). The Writing and Language Practice Pre/Post Test were 44 questions (Writing and Language Practice Test 2 found in appendix). The answer sheets for each test came from the College Board website (Answer sheets in appendix). In this study, the independent variable was the SAT, Practice test scores while the dependent variable was Khan Academy tutorial videos.

Description of Specific Procedures

On Wednesday, February 1st, twelve students in the researcher’s 10th Grade English class took a SAT Reading Practice, Pre-Test. This was a 65 minute, timed test, in which students read several passages and answered 52 multiple-choice questions. Their answers were recorded on a Practice SAT Answer Sheet (copy of this answer sheet in appendix). On Thursday, February 2nd students took a SAT Writing and Language Practice, Pre-Test (copy of test in appendix) This was a 35 minute, timed test, in which students answered 44 multiple choice questions pertaining to conventions of standard written English. Their answers were recorded on a Practice SAT Answer Sheet (A copy of this answer sheet is attached).
When the SAT Reading Practice, Pre-Test and SAT Writing and Language Practice, Pre-Test were complete, the researcher scored them on accuracy using the answer key for this respective SAT Practice Test provided by College Board website.

For the Reading SAT Practice, Pre-Test student scores could range 0/52 to 52/52. For the Writing and Language Practice, Pre-Test student scores could from 0/44 to 44/44. Thus, students had two, practice, pre-test scores that served as baseline data, a SAT Reading Practice, Pre-Test, and a SAT Writing and Language Practice, Pre-Test.

When the researcher received student’s consent letters, the researcher meet with the willing participants and assigned them a number, which represented their data. This number was a random, confidential number to represent their results, and their scores were recorded on Microsoft Excel.

Immediately following pre-testing on Wednesday, February 1 and Thursday, February 2, the researcher showed students daily, Khan Academy videos (titles and video link in appendix). The researcher went through the videos in numerical order, video 1 to video 44. Some Khan Academy videos taught information and strategies pertaining to the SAT Reading Test while others taught information and strategies pertaining to the SAT Writing and Language Test. Some videos ranged from 20 minutes of instruction while others were as short as 1 minute of instruction. Depending on scheduling and length of the video, 1-3 videos were shown daily on researcher’s classroom projector, until all 44 Khan Academy Videos pertaining to the SAT Reading Test and SAT Writing and Language Test were shown. The next day, students took the SAT Reading Practice, Post-Test in class, which was on Thursday, April 4. This was a 65 minute, timed test, in which students read several passages and answered 52 multiple-choice questions. They recorded their answers on a Practice SAT, Answer Sheet. The next day, Friday, April 5, students will took the SAT Writing and Language Practice, Post-Test. This was a 35 minute, timed test, in which students answered 44 multiple-choice questions pertaining to conventions of standard written English. They recorded their answers on a Practice, SAT Answer Sheet.
For the Reading SAT Practice, Post-Test student scores ranged from 0/52 to 52/52. For the Writing and Language Practice, Post-Test student scores ranged from 0/44 to 44/44. Thus, student had two; post-test scores to serve as outcome data.

Once data was collected in this study, the SAT Reading, and Writing/Language, Pre-Test results and SAT Reading and Writing/Language, and Post-Test results were put into Pearson’s Correlation Formula to calibrate the positive or negative strength of correlation resulting from exposure to the Khan Academy tutorial videos. This data was calibrated and represented using Microsoft Excel via charts.

This study was conducted using SAT Reading, and Writing Practice tests scores as the independent variable. Pre-Tests were taken Wednesday, February 1 and Thursday, February 2. The Post-Tests were taken on Thursday, April 4 and Friday, April 5. Between the Pre-testing dates and Post-Testing dates 44 Khan Academy videos were shown in class between these dates with 1-3 videos shown daily depending on classroom lesson plans.
Chapter 4 - Results, Analysis, and Data

Using Khan Academy videos pertaining to SAT Reading, and Writing and Language instructional material, the researcher intended to verify the strength of correlation, using Pearson’s Correlation Formula, between SAT Reading Practice, Pre-Tests, and SAT Writing and Language Practice, Pre-Tests, and SAT Reading Practice, Post-Tests, and SAT Writing and Language Practice, Post-Tests.

Students completed the SAT Reading, Practice Pre-Test on Wednesday, February 1. Students completed the SAT Writing and Language Practice, Pre-Test on Thursday, February 2. Throughout the next 40 class periods, respectively, 44 Khan Academy videos pertaining to the SAT Reading, and SAT Writing and Language material were shown in class. Once the researcher exposed students to all 44 videos, students completed the SAT Reading Practice, Post-Test on Thursday, April 13. Students completed the SAT Writing and Language Practice, Post-Test on Friday, April 14.

Once the Pre-Test and Post-Test were assessed by the researcher, the researched used Microsoft Excel and Pearson’s Correlation Formula to verify the strength of correlation between the Pre-Test and Post-Test scores after students watched the 44 Khan Academy videos.

**SAT Reading Practice, Pre/Post Test Results**

Estimates for interpreting strengths of correlation are as following in the chart below:

<table>
<thead>
<tr>
<th>Size of Correlation</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>.90 to 1.00 (−.90 to −1.00)</td>
<td>Very high positive (negative) correlation</td>
</tr>
<tr>
<td>.70 to .90 (−.70 to −.90)</td>
<td>High positive (negative) correlation</td>
</tr>
<tr>
<td>.50 to .70 (−.50 to −.70)</td>
<td>Moderate positive (negative) correlation</td>
</tr>
<tr>
<td>.30 to .50 (−.30 to −.50)</td>
<td>Low positive (negative) correlation</td>
</tr>
<tr>
<td>.00 to .30 (−.00 to −.30)</td>
<td>negligible correlation</td>
</tr>
</tbody>
</table>
Pearson’s Correlation Formula is represented below. The researcher used this formula (which is a statistical, default formula on Microsoft Excel) to determine the impact Khan Academy videos had on scores.

**Pearson’s Correlation Formula**

\[
 r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}
\]

The results below, using Pearson’s Correlation Formula, showed there was a very, high positive correlation between the SAT Reading Practice Pre-Test (the independent variable) and the SAT Reading Practice, Post-Test (the dependent variable) was approximately .89. This illustrated that showing students Khan Academy videos pertaining to the SAT Reading Test did in fact help their scores improve. A very high, positive correlation resulted from experimenting with Khan Academy.

<table>
<thead>
<tr>
<th>Student Number</th>
<th>SAT Reading Practice Pre-Test</th>
<th>SAT Reading Practice Post-Test</th>
<th>Pearson's Correlation Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>17</td>
<td>0.88</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>19</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
The chart below illustrates the gains, on average, of each student as well as the overall, average gains of those students on the SAT Reading, Practice Test.

<table>
<thead>
<tr>
<th>Student Number</th>
<th>SAT Reading Practice Pre-Test</th>
<th>SAT Reading Practice Post-Test</th>
<th>Growth by Percentage</th>
<th>Average Growth by Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>17</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>25</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>15</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>26</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>27</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>19</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11</td>
<td>20</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>21</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>20</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>17</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>19</td>
<td>26</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>15</td>
<td>12%</td>
<td></td>
</tr>
</tbody>
</table>

(Rounded to nearest %)

Students’ SAT Reading, Practice Test scores increased by 12% on average due to implementation of Khan Academy as a remedy to bridge the achievement gap.

Below are bar charts showing the SAT Reading Practice, Pre-Test results and SAT Reading Practice, Post-Test results.
Below is a side-by-side comparison between the SAT Reading Practice, Pre-Test results and SAT Reading Practice, Post-Test results where the SAT Reading Practice, Pre-Test results are represented in blue, and the SAT Reading Practice, Post-Test results are presented in orange.
SAT Writing and Language Practice, Pre/Post Test Results

Estimates for interpreting strengths of correlation are as following in the chart below:

<table>
<thead>
<tr>
<th>Size of Correlation</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>.90 to 1.00 (−.90 to −1.00)</td>
<td>Very high positive (negative) correlation</td>
</tr>
<tr>
<td>.70 to .90 (−.70 to −.90)</td>
<td>High positive (negative) correlation</td>
</tr>
<tr>
<td>.50 to .70 (−.50 to −.70)</td>
<td>Moderate positive (negative) correlation</td>
</tr>
<tr>
<td>.30 to .50 (−.30 to −.50)</td>
<td>Low positive (negative) correlation</td>
</tr>
<tr>
<td>.00 to .30 (.00 to −.30)</td>
<td>Negligible correlation</td>
</tr>
</tbody>
</table>

Pearson’s Correlation Formula is represented below. The researcher used this formula (which is a statistical, default formula on Microsoft Excel) to determine the impact Khan Academy videos had on scores.

Pearson’s Correlation Formula

\[
 r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}
\]
The results below, using Pearson’s Correlation Formula, showed there was a very, high positive correlation between the SAT Writing and Language Practice Pre-Test (the independent variable) and the SAT Writing and Language Practice, Post-Test (the dependent variable) was approximately .86. This illustrated that showing students Khan Academy videos pertaining to the SAT Writing and Language test did in fact help students’ scores improve. A very, high positive correlation resulted from experimenting with Khan Academy.

<table>
<thead>
<tr>
<th>Student Number</th>
<th>SAT Writing and Language Pre-Test</th>
<th>SAT Writing and Language Post-Test</th>
<th>Pearson’s Correlation Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>11</td>
<td>0.86</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>18</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

The chart below illustrates the gains, on average, of each student as well as the overall, average gains of those students on the SAT Writing and Language, Practice Test.

<table>
<thead>
<tr>
<th>Student Number</th>
<th>SAT Writing and Language Pre-Test</th>
<th>SAT Writing and Language Post-Test</th>
<th>Growth by Percentage</th>
<th>Average Growth by Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>11</td>
<td>14%</td>
<td>11%</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>20</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>15</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>25</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>30</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>16</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>22</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>20</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>14</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>11</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>13</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>18</td>
<td>22</td>
<td>9%</td>
<td></td>
</tr>
</tbody>
</table>

Rounded to nearest %
Below are bar charts showing the SAT Reading Practice, Pre-Test results and SAT Reading Practice, Post-Test results.

Below is a side-by-side comparison between the SAT Writing and Language Practice, Pre-Test results and SAT Writing and Language Practice, Post-Test results where the SAT Writing and Language Practice, Pre-Test results are represented in blue, and the SAT Writing and Language Practice, Post-Test results are presented in orange.
This study was conducted using SAT Reading, and Writing Practice tests scores as the independent variable. Pre-Tests were taken Wednesday, February 1 and Thursday, February 2. The Post-Tests were taken on Thursday, April 4 and Friday, April 5. Between the Pre-Testing dates and Post-Testing dates 44 Khan Academy videos were shown in class between these dates with 1-3 videos shown daily depending on classroom lesson plans. The results using Pearson’s Correlation Formula showed there was a very, high positive correlation between the SAT Reading Practice Pre-Test and the SAT Reading Practice, Post-Test (the independent variable) was approximately .89. This illustrated that showing students Khan Academy videos (the dependent variable) pertaining to the SAT Reading Test did in fact help their scores improve. A very high positive correlation resulted from experimenting with Khan Academy. Furthermore, the results using Pearson’s Correlation Formula, showed that there was a very, high positive correlation between the SAT Writing and Language Practice Pre-Test and the SAT Writing and Language Practice, Post-Test (the independent variable) was approximately .86. This illustrated that showing students Khan Academy videos (the dependent variable) pertaining to the SAT Writing and Language test did in fact help students’ scores improve. A very, high positive correlation resulted from experimenting with Khan Academy.
Nettle, Millet, and Ready (2003) shared that a plethora of theories explain the perpetual, lower academic performance of African American students...changing curricula offered by schools is perhaps the easiest intervention and most immediate intervention. Diamond (2007) noted that while differences in instruction contribute to educational inequality, the current emphasis on standardized testing, and rigorous instructional content emphasizes exposing all children to the kind of instruction once reserved for the social and economic elite. Khan Academy seeks to be this means of exposure to bridge the prior disparity of access to quality instruction, particularly instruction directly related to high-stakes testing. This study sought to see if Khan Academy would serve as immediate and effective curricula to bridge the achievement gap on standardized testing facing students of minority and low, socio-economic status and be the kind of instruction to expose all children to rigorous, preparatory material.

A strong, positive correlation existed in this study when inputting the data into Pearson’s Correlation Formula. Both the SAT Writing and Language and Reading Practice Tests scores (independent variable) improved because of showing the 44 Khan Academy videos (dependent variable) between both testing dates. The results using Pearson’s Correlation Formula showed that there was a very, high positive correlation between the SAT Reading Practice Pre-Test and the SAT Reading Practice, Post-Test (the independent variable) was approximately .89. Moreover, the results using Pearson’s Correlation Formula, showed that there was a very, high positive correlation between the SAT Writing and Language Practice Pre-Test and the SAT Writing and Language Practice, Post-Test (the independent variable) was approximately .86. PR Newswire (2016) also explained that these interactive practice tools are designed to help level the playing field for students who are interested in taking the SAT and preparing for college-level courses. Clearly, based this study’s results using Pearson’s Correlation Formula, Khan Academy (this study’s dependent variable) did assist with leveling the playing field and bridging achievement gap.

In general, the participants felt like the videos prepared them for the Post-Tests, and all students participating in this study were proud that they showed growth on their Post-Tests. Some of the participants
felt very confident on these two sections of the PSAT 10 they took shortly after the study concluded on April 11. The researcher was confident the use of Khan Academy helped bridge the achievement gap, which has typically defined the participants in this study most of their educational years.

The researcher plans to continue to use Khan Academy next school year. However, a few changes will occur. As teacher, the researcher will re-explain the concept after each video, answer student questions, and create lessons on concepts in which students struggled. During this study, the researcher simply pressed play and showed the videos to isolate the impact of these Khan Academy tutorial videos (the dependent variable) pertaining to the Reading, and Writing and Language portion of the SAT without the outside influence of the researcher. The researcher believes this change will bring about more student growth.

This study challenges further research on the relevance and impact of Khan Academy. This study sets the stage for other educators to test the impact Khan Academy could have upon their respective subject areas. One could also use Khan Academy in their curriculum to track the growth between students’ actual PSAT 9, PSAT 10, and SAT scores as a research project. As Khan Academy is a relativity new tool, research currently with Khan Academy is limited.

The researcher respects the work on Sal Khan and his commitment to provide excellent preparation for everyone, regardless of race and socio-economic status to prepare for the new SAT. Students of minority and low, socio-economic status can no longer be slighted, but they have a right to be provided with rigorous, engaging, and cutting edge instruction, which is typically withheld from them. Our society, specifically government officials and educationists, cannot allow the achievement gap to exist between low, income minority students, and higher-class, Caucasians. Any meaningful and data driven step must be attempted to remedy this injustice.
References:


PR Newswire, New York. (2016) One year since launch, official SAT practice on Khan academy is leveling the playing field for students: 1.4 million users have taken advantage of free, interactive, and personalized SAT practice.


Appendices

Research Resources
Does Khan Academy Positively Affect SAT Reading, and Writing and Language Practice Scores

Hello! My name is Michael Ketelaar. I am your child’s 10th grade English teacher at Crossroads Alternative High School in Kentwood, Michigan. I am additionally in the process of completing my Masters in the Art of Teaching Degree at Aquinas College in Grand Rapids, Michigan. As such, I plan to do a research study that considers if using Khan Academy (an educational website with tutorial videos) in my classroom will positively affect your child’s SAT Reading, and Writing and Language practice scores. This letter is to inform you of the study and seek your consent if you desire your child to participate in the study and have their testing results used as data for my research. This study been approved by my principal at Crossroads Alternative High School, Mr. Rick Hatfield (Please see attached letter with this Consent Form).

At the beginning of the semester your child will be taking a practice Reading, and Writing and Language SAT test in my classroom. These two tests will serve as pre-tests. After students have taken these pre-tests, your child will be exposed to tutorial videos on Khan Academy for several months in class. Khan Academy is an educational website with material to help students on standardized testing. Your child will watch these instructional videos in class on my classroom projector, which show tactics and strategies to be successful on these aspects of the SAT. This will continue for several months, daily, until I have shown 51 videos pertaining to the Reading, and Writing and Language aspects of the SAT. Near the end of the semester, your child will take a post, SAT Reading, and Writing and Language practice test. I will be using the pre-test and post-tests to see if growth exists between the two tests due to the use of Khan Academy tutorial videos. All students in my 10th grade classes will be performing the pre and post-tests and being exposed to Khan Academy videos. However, only research participant data will be used for this study. If consent has not been given, the student’s data will not be used in this study.

There are no known risks associated with this research. The benefits of this research will let educators know if using Khan Academy tutorial videos is an effective tool for helping students increase their SAT Reading and Writing and Literature scores in a high school setting, particularly alternative high school setting.

All of the information from this study will be confidential, and no names will appear in the research documents. Students will be assigned a random number, which I will only know, to track their testing results. All results will be confidential. Only myself, and my faculty research adviser, Dr. Carol Winkle, and my principal Mr. Rick Hatfield, will have access to consent forms and other documents. All tests and information gathered will be locked, securely in a cabinet behind my desk. When the research is complete, it will be destroyed using a paper-shredder.

Your student’s participation in this strictly is voluntary. You may choose not to consent, and you may withdraw your consent at any time. You will not be penalized in any way should you decide at any time not to participate or to withdraw your student from this study. If desired, the results of my study will be available to the parents/guardians of the participants. If you desire a copy of the study at the end, please let me know, and I will gladly e-mail or mail the results to you.

If you have any questions or concerns about this study or if any problems arise, please contact Michael Ketelaar at (616) 813-4765 or email me at ketelmic@aquinas.edu or contact Dr. Carol Winkle at (616) 632-2434 or via e-mail at winkcar@aquinas.edu who is my Faculty Research Advisor at Aquinas College.

Thanks for your time and consideration. I look forward to working with you and your child at Crossroads Alternative High School.
By signing your name below, you indicate that you have read and understand the preceding information, have received satisfactory answers to any questions you may have had, and voluntarily give consent for your child to participate in this study knowing that you may withdraw your child at any time, if desired, without penalty. There are two copies of this consent form. Kindly, keep one for your records and send the other with the self-addressed envelope.

Parents/Guardians of Participant Printed Name: ____________________________
Parents/Guardians of Participant Signature: ______________________________

Student’s Printed Name: ____________________________
Student’s Signature: ______________________________
Khan Academy Video Titles and Links

SAT Reading Khan Academy Videos

1. SAT Reading: Science How To Part 1:

2. SAT Reading: Science How To Part 2

3. SAT Reading: Literature How To Part 1

4. SAT Reading: Literature How To Part 2

5. SAT Reading: History and Social Studies How To Part 1

6. SAT Reading: History and Social Studies How To Part 2

7. SAT Reading: Social Science How To Part 1
Running Head: Diminishing the Achievement Gap in Alternative High Schools

8. SAT Reading: Social Science How To Part 2

SAT Language Khan Academy Videos

1. SAT Writing: Argument: How To Example

2. SAT Writing: Informative: How To Example

3. SAT Writing: Narrative: How To Example

4 SAT Grammar: Precision: Basic Example

5. SAT Grammar: Precision: Harder Example

6. SAT Grammar: Concision, Style, and Tone: Basic Example

7. SAT Grammar: Concision, Style, and Tone: Harder Example 1
8. SAT Grammar: Concision, Style, and Tone: Basic Example 2

9. SAT Grammar: Concision, Style, and Tone: Harder Example 2

10. SAT Grammar: Syntax Basic Example

11. SAT Grammar: Sentence Boundaries: Harder Example

12. SAT Grammar: Subordination and Coordination: Basic Example

13. SAT Grammar: Subordination and Coordination: Harder Example

14. SAT Grammar: Parallel Structure: Basic Example

15. SAT Grammar: Parallel Structure: Harder Example

16. SAT Grammar: Modifier Placement: Basic Example
17. SAT Grammar: Modifier Placement: Harder Example

18. SAT Grammar: Shift in Verb, Tense, and Mood: Basic Example

19. SAT Grammar: Shift in Verb, Tense, and Mood: Harder Example

20. SAT Grammar: Pronoun Person and Number: Basic Example

21. SAT Grammar: Pronoun Clarity: Basic Example

22. SAT Grammar: Pronoun Antecedent Agreement: Basic Example

23. SAT Grammar: Pronoun Antecedent Agreement: Harder Example

24. SAT Grammar: Possessive Determiners: Basic Example
25. SAT Grammar: Possessive Determiners: Harder Example

26. SAT Grammar: Subject Verb Agreement: Basic Example

27. SAT Grammar: Subject Verb Agreement: Harder Example

28. SAT Grammar: Noun Agreement: Basic Example

29. SAT Grammar: Noun Agreement: Harder Example

30. SAT Grammar: Frequently Confused Words: Basic Example

31. SAT Grammar: Frequently Confused Words: Harder Example

32. SAT Grammar: Conventional Expression: Basic Example
33. SAT Grammar: Conventional Expression: Harder Example

34. SAT Grammar: Logical Comparisons: Harder Example

35. SAT Grammar: End of Sentence Punctuation: Basic Example

36. SAT Grammar: Within Sentence Punctuation: Harder Example

37. SAT Grammar: Within Sentence Punctuation: Basic Example

38. SAT Grammar: Within Sentence Punctuation: Harder Example 2

39. SAT Grammar: Possessive Pronouns: Harder Examples

40. SAT Grammar: Items in a Series: Basic Example

41. SAT Grammar: Items in a Series: Harder Example
Running Head: Diminishing the Achievement Gap in Alternative High Schools


42. SAT Grammar: Nonrestrictive and Parenthetical Elements: Basic Example

44. SAT Grammar: Nonrestrictive and Parenthetical Elements: Harder Example