A STUDY OF THE EFFECTS OF DIFFERENTIATED INSTRUCTION ON STUDENT ACHIEVEMENT IN REGARDS TO THE ACT TEST

By

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ABSTRACT

Prior research suggests that test preparation can increase student performance on standardized assessments. The current study will address the performance on the Academic College Test by examining the relationship between participation in the ACT Academy and success in high school seniors. Students ages 17-18 that took the ACT were divided into two groups, students who participated in the ACT Academy and students who did not participate in the ACT Academy at a Midwestern high school. The result of this study indicated that participation in the ACT Academy was a significant predictor of performance on the ACT.
INTRODUCTION

Background Issues and Concerns

With the implementation of President Bush’s No Child Left Behind Act (NCLB) of 2001, pressure was placed on school districts to increase test scores to meet Adequate Yearly Progress (AYP) in performance reviews. The added emphasis on standardized test scores held school districts accountable for student achievement in the classroom. As a result of the education shift, the SJSD reviewed testing data and concluded emphasis should be placed on increasing student scores on the Academic College Test (ACT). School District officials began researching for an approach that could be utilized and adapted to best fit the needs of the district. In February 2007, teachers and school officials attended the statewide ACT conference. They discovered a consulting firm (Focus on Learning) that ran an ACT preparatory class that was achieving consistent results. The SJSD decided that consultants from the Focus on Learning Group should be hired to train teachers in test-taking tips to increase student scores and alleviate anxiety on the standardized test. The firm was willing to work with the students and allow the teachers to “fishbowl” the process so that we could replicate their practice in our buildings. From this process the ACT Academy was born, which trains students in each high school to prepare for the ACT.

Before the Academy was launched, the school district reviewed data and implementation of ACT strategies. A fragmented focus existed in each of the district’s three high schools, ranging from semester ACT classes to no mention at all of the ACT in core classes. Different strategies were used at varying levels, and no district wide plan existed to help students succeed on the exam. Each classroom teacher was responsible for teaching, or not teaching, the ACT. The lack of focus combined with flat-lined scores led school officials to create a district
Differentiated Instruction in High School

professional development initiative. Consultants came to train teachers through the first District ACT Academy. Sixty students from the district met at an offsite location, and staff “fish-bowled” the teaching strategies by sitting on the fringe of the room and observing instruction. Each high school building then created and modeled their own ACT Academies based on student need and building schedules. This new framework created a common language and a cohesive model for implementation in each high school. SJSD has implemented the ACT Academy several times per year during the last three years. The focus of the program evaluation will be on the implementation of the ACT Academy at one of the high schools in the SJSD.

*Practice under Investigation*

The ACT Academy is run for four days leading up to each of the Saturday ACT assessment dates throughout the school year. The students are taught about the format of the test and test-taking strategies specific to the ACT test. The students also receive content review.

*School Policy to be Informed by Study*

All students signed up to take the ACT test would be encouraged to take the ACT Academy due to the impact of the Academy on student test scores.

*Conceptual Underpinnings*

According to the SJSD, the ACT Academy was implemented for students with the goal of raising student scores on the ACT by participating in three to five day sessions led by teachers. The SJSD made assumptions that the student scores would increase when given review strategies, test-taking tips, and information on how to navigate the test to alleviate stress. The SJSD believes that the students that participate in the ACT Academy will have higher achievement on the ACT test. This study arose from the need to justify taking students and teachers out of the classroom four different weeks throughout the school year in preparation for
the ACT test. Was time spent out of the regular classroom a benefit to the student, or did it create unexpected hardships regarding homework and make-up work? What impact did the Academy have on teachers and their own classes when they had a substitute for the day while teaching the Academy? Is the impact of potentially increased scores worth the trade-off regarding resources and time? The SJSD needs to evaluate all programs to ensure effectiveness and determine whether or not it is worth sustaining.

Statement of the Problem

In recent years, the school district has been under continuous pressure to improve test scores, specifically the ACT, to help meet AYP standards for NCLB, and now Missouri School Improvement Program 5 (MSIP5). The Administration wants to see an improvement in the composite ACT score for the district. They implemented the ACT Academy to resolve the issue.

Purpose of the Study

The primary purpose of this study is to discover if the ACT Academy has impacted students who have participated in the high school program by analyzing the impact of the ACT Academy on student’s achievement on the ACT test. The secondary purpose would be to offer feedback and findings to the building administrator with the hope of refining and strengthening the overall influence of the program. The information gained will help administrators develop and improve the ACT Academy to increase student achievement on the ACT test.

Research Questions

RQ 1: Is there a difference in student performance on the ACT test between students who participated in the ACT Academy and students who did not participate in the ACT Academy?
Null Hypothesis

H₀: There is no difference in student performance on the ACT test between students who participated in the ACT Academy and students who did not participate in the ACT Academy.

Anticipated Benefits of the Study

The result of this study will inform school officials about the effects of differentiated instruction on student achievement in regards to the ACT test. It will help school officials know which subtest(s) of the ACT Academy are successful and which subtest(s) need to improve their workshop.

Definition of Terms

Adequate Yearly Progress: “The No Child Left Behind Act (NCLB) of 2001 requires all schools, districts/local education agencies (LEAs) and states to show that students are making Adequate Yearly Progress (AYP). NCLB requires states to establish targets in the following ways:

- Annual Proficiency Target: The law requires a set target for all students and student subgroups to meet in a progressive nature that would result in all students scoring at or above the proficient level on the state’s assessment by 2014.
- Attendance /Graduation Rates: The law requires schools, district/LEAs and states to meet an additional indicator based on improvement or established targets in attendance and/or graduation rates.
- Participation Rates: The law requires all students and student subgroups to meet a 95% participation rate.

Missouri’s AYP targets were established by the Missouri Department of Elementary and Secondary Education based on a formula from the NCLB Act and an analysis of Missouri
Assessment Program (MAP) data, attendance rate data and graduation rate data from prior years. When all targets are met, the requirements of AYP are met” (DESE, 2013).

Fishbowl: Fishbowl is a strategy that can be used in classrooms or business meetings where group dynamics are important. A small group of students (as many as half the class) will conduct a discussion, experiment, or activity together while the rest of the students watch, take notes, and later pose questions and give comments about what they observed. The guidelines for the outside circle may include listening quietly, taking notes on discussion skills, and noting nonverbal communication.

Summary

In recent years, the school district has been under continuous pressure to improve test scores, specifically the ACT, to help meet AYP standards for NCLB, and now Missouri School Improvement Program 5 (MSIP5). The Administration wants to see an improvement in the composite ACT score for the district. They implemented the ACT Academy to resolve the issue. The current study will extend the literature by examining the impact of ACT Academy on performance on the ACT. Previous research has suggested that differentiated instruction will positively affect academic performance, but is unclear whether these relations are consistent with standardized test preparation. The primary purpose of this study is to discover if the ACT Academy has impacted students who have participated in the high school program by analyzing the impact of the ACT Academy on student’s achievement on the ACT test.
Scores on standardized admissions tests take on a great deal of significance for any student that plans on attending a four-year college or university. Most college bound students must take the Scholastic Aptitude Test (SAT) or the American College Test (ACT) as part of the college admissions process. In addition, these tests are frequently used to determine scholarships for students. According to Dvorak (2003), over 80% of higher education universities and colleges require students to take one of these exams to measure “college readiness.” According to ACT.org, the ACT exam is an achievement test, “measuring high school students’ general educational development and their ability to complete college-level work” (ACT, 2013). The ACT states “ACT postsecondary research and solutions provide college and university administrators with the necessary data and tools to influence core institutional strategic initiatives for retention, persistence, and outcomes” (ACT, 2013).

The competition amongst students in the college entrance process and with college scholarships puts extra pressure on high school students to do well on the ACT, which in turn, creates a need for test preparation. Test preparation companies are also aware of how important ACT scores have become to students. Thus, “a multimillion dollar industry prepares many high school students to take these exams” (Allensworth, 2008, p. 7). In the state of Missouri, the ACT exam is of particular importance to teachers and school administrators because it is included in the state’s accountability system, MSIP5. According to the Missouri Department of Elementary and Secondary Education (2013), one of the policy goals for MSIP5 is to “articulate the state’s expectations for student achievement with the ultimate goal of all students graduating ready for success in college and careers.”
High school students prepare for the ACT in a variety of ways that include personal tutoring, classroom tutoring, and other test prep review methods. According to ACT, the best preparation is taking challenging courses in high school. Test prep can be very expensive. A booming multimillion-dollar industry sells information to help prepare many high school students to take the ACT exam. Dvorak (2003) explains the most expensive programs involve classroom and private tutoring offered by Kaplan and Princeton Review and range respectively from $799 to $2700. Private tutoring sessions average over $1,000 per student.

Test preparation has become big business, and high schools have also placed a great deal of emphasis on improving test scores. Many schools spend a great amount of time during the school day on test prep ACT type activities. According to Allensworth, Correa, and Ponisciak (2008), schools actively work to motivate students to take and do well on the ACT. One of the most effective ways to motivate students is to involve them in the assessment process. The student needs to identify where they are trying to go, where they are now, and how they can get there regarding their ACT score (Chappuis, 2009). Regardless of the source of test preparation in academic courses, students generally characterize test preparation as doing sample test items, as much test-prep work involves learning test-taking strategies. Students and teachers believe ACT scores are largely determined by test-taking skills. “Most students believe that ACT scores are strongly determined by tenacity and practice” (Allensworth, Correa, & Ponisciak, 2008, p. 7).

Clearly, college admissions tests have psychological and economic significance in the United States (Allensworth, 2008). Proponents of test prep courses promote their product as the answer to raising test scores, but "They are not a cure-all. They are simply a tool" (Adams, 2011, p. 11). Many agree. “The best preparation for college-admissions tests is good math and English classes in high school,” said Lisa Sohmer, the director of college counseling at the Garden School in
Jackson Heights, NY. "Students get from these [prep] classes precisely what they put into them," she said. Therefore, “Test-prep courses may serve a purpose, but more important is the rigor of the classes students take” (Adams, 2011, p. 11).

A study by Focus on Learning (2012) does not dispute the importance of a rigorous curriculum, but does attempt to identify a gain that can be directly attributable to coaching that goes beyond any gains attributable to rigorous high school courses. Test prep that incorporates differentiated instruction by identifying a need and adjusting instruction to target that need can be very effective in helping students master a specific learning goal or addressing a specific misconception or problem (Chappuis, 2009, p. 13). Also, Allensworth (2008) suggested that rigorous tests measuring skills needed in the real world might be successful at getting schools to improve their instructional rigor and provide valid assessments of learning.

In summary, individual short-term test preparation activities appear to have a relatively small, albeit positive, impact on ACT scores. The majority of gains from test prep programs are not as significant as compared to long-term activities, like rigorous course-work. As long as students are ready and motivated to learn and the courses cover the proper material, simply taking the right core courses in high school can increase ACT scores more than does any one of the most beneficial short-term test preparation activities. What’s more, taking specific courses beyond the recommended core curriculum can increase ACT scores. Thus, it appears that the courses students take in high school matter much more than short-term test preparation activities, but it is important to note that small increases in test scores have been attributed to certain test prep courses.
RESEARCH METHODS

Research Design

The researcher gathered and analyzed ACT scores from students that took the ACT test and compared the results of the students that participated in the Academy versus students that did not participate in the Academy. The independent variable is the students. The dependent variable is the scores on the ACT.

Study Group Description

The population for this study was composed of students who had taken the ACT test from a Midwestern high school during the 2012-2013 school year. The students were seniors in high school, approximately 60% female, and majority Caucasian. The majority of the students were from low-middle socioeconomic status and lived in the same area of town. The sampling method chosen for this study was a convenience sample. This method was chosen due to the time frame associated with the project and this school years data is of more interest to the building administration and myself. Ideally, the preference would be to have a sample of all students that have participated in the ACT Academy over the history of the program, but time prohibited this from occurring.

Data Collection and Instrumentation

Data was collected from the counseling office using the data that they received from ACT.

Statistical Analysis Methods

A t-test was performed to determine whether there is a significant relationship between the students taking the ACT Academy and increased test scores.
FINDINGS

**T-test Analysis Results for Non-ACT Academy and ACT Academy Composite scores**

<table>
<thead>
<tr>
<th>Source</th>
<th>Mean Difference</th>
<th>t-test</th>
<th>Df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-ACT Academy Composite (n = 60)</td>
<td>19.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT Academy Composite (n = 47)</td>
<td>21.234</td>
<td>-2.034</td>
<td>-2.25</td>
<td>102.77</td>
</tr>
</tbody>
</table>

Note: Significant when p ≤ 0.25

All one hundred and seven students that took the ACT were selected to observe the differences between their performance on the national ACT test with and without participation in the ACT Academy. The seniors that have taken the ACT were divided into two groups: the ACT Academy participants (47) were placed in one group and the non-ACT Academy participants (60) were placed in another. The mean ACT Composite of the non-ACT Academy students was 19.2 and the mean ACT Composite of the students after participating in the ACT Academy was 21.234. The Mean Difference, or difference between the two groups, was -2.034. The t-test result was -2.25 and the df was 102.77. The null hypothesis states there is not a significant difference in ACT Composite scores based on participation in the ACT Academy. Since the p-value was 0.0131715, and the Alpha number was set at 0.25, the null hypothesis must be rejected. Therefore, there is a significant difference in ACT Composite test scores based on the participation in the ACT Academy. The ACT Academy participants with the mean score of 21.234 scored significantly higher than the non-ACT Academy participants with the mean score of 19.2.
T-test Analysis Results for Pre-ACT Academy and Post-ACT Academy Composite scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>t-test</th>
<th>Df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-ACT Academy Composite (n = 36)</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post ACT Academy Composite (n = 36)</td>
<td>21.611</td>
<td>-1.611</td>
<td>-6.62</td>
<td>35</td>
<td>0.0001</td>
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</table>

Note: Significant when p ≤ 0.25

All thirty-six students that participated in the SJSD ACT Academy were selected to observe the differences between their pre-test performance and their post-test performance on the national ACT test. The mean ACT Composite of the students prior to their participation in the ACT Academy was 20 and the mean ACT Composite of the students after participating in the ACT Academy was 21.611. The Mean Difference, or difference between the two groups, was -1.611. The t-test result was -6.62 and the df was 35. The null hypothesis states there is not a significant difference in ACT Composite scores based on participation in the ACT Academy. Since the p-value was 0.0001, and the Alpha number was set at 0.25, the null hypothesis must be rejected. Therefore, there is a significant difference in ACT Composite test scores based on the participation in the ACT Academy. The post-test with the mean score of 21.611 scored significantly higher than the pre-test with the mean score of 20.
T-test Analysis Results for Pre-ACT Academy and Post-ACT Academy English scores

<table>
<thead>
<tr>
<th>Source</th>
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<th>Mean Difference</th>
<th>t-test</th>
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<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-ACT Academy English</td>
<td>19.5278</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post ACT Academy English</td>
<td>21.75</td>
<td>-2.2222</td>
<td>-4.09</td>
<td>35</td>
<td>0.00012</td>
</tr>
</tbody>
</table>

Note: Significant when p ≤ 0.25

All thirty-six students that participated in the SJSD ACT Academy were selected to observe the differences between their pre-test performance and their post-test performance on the national ACT test. The mean ACT English score of the students prior to their participation in the ACT Academy was 19.5278 and the mean ACT English score of the students after participating in the ACT Academy was 21.75. The Mean Difference, or difference between the two groups, was -2.2222. The t-test result was -4.09 and the df was 35. The null hypothesis states there is not a significant difference in ACT English scores based on participation in the ACT Academy. Since the p-value was 0.00012, and the Alpha number was set at 0.25, the null hypothesis must be rejected. Therefore, there is a significant difference in ACT English test scores based on the participation in the ACT Academy. The post-test with the mean score of 21.75 scored significantly higher than the pre-test with the mean score of 19.5278.
All thirty-six students that participated in the SJSD ACT Academy were selected to observe the differences between their pre-test performance and their post-test performance on the national ACT test. The mean ACT Math score of the students prior to their participation in the ACT Academy was 19.9444 and the mean ACT Math score of the students after participating in the ACT Academy was 21.25. The Mean Difference, or difference between the two groups, was -1.3056. The t-test result was -4.35 and the df was 35. The null hypothesis states there is not a significant difference in ACT Math scores based on participation in the ACT Academy. Since the p-value was 0.0001, and the Alpha number was set at 0.25, the null hypothesis must be rejected. Therefore, there is a significant difference in ACT Math test scores based on the participation in the ACT Academy. The post-test with the mean score of 21.25 scored significantly higher than the pre-test with the mean score of 19.9444.
### T-test Analysis Results for Pre-ACT Academy and Post-ACT Academy Reading scores

<table>
<thead>
<tr>
<th>Source</th>
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<th>Mean Difference</th>
<th>t-test</th>
<th>Df</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Pre-ACT Academy Reading (n = 36)</td>
<td>19.7778</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Post ACT Academy Reading (n = 36)</td>
<td>20.6389</td>
<td>-0.8611</td>
<td>-1.83</td>
<td>35</td>
<td>0.037889</td>
</tr>
</tbody>
</table>

Note: Significant when p \( \leq 0.25 \)

All thirty-six students that participated in the SJSD ACT Academy were selected to observe the differences between their pre-test performance and their post-test performance on the national ACT test. The mean ACT Reading score of the students prior to their participation in the ACT Academy was 19.7778 and the mean ACT Reading score of the students after participating in the ACT Academy was 20.6389. The Mean Difference, or difference between the two groups, was -1.83. The t-test result was -1.83 and the df was 35. The null hypothesis states there is not a significant difference in ACT Reading scores based on participation in the ACT Academy. Since the p-value was 0.037889, and the Alpha number was set at 0.25, the null hypothesis must be rejected. Therefore, there is a significant difference in ACT Reading test scores based on the participation in the ACT Academy. The post-test with the mean score of 20.6389 scored significantly higher than the pre-test with the mean score of 19.7778.
T-test Analysis Results for Pre-ACT Academy and Post-ACT Academy Science scores

<table>
<thead>
<tr>
<th>Source</th>
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<th>Mean Difference</th>
<th>t-test</th>
<th>Df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-ACT Academy Science (n = 36)</td>
<td>21.1389</td>
<td>-1.0833</td>
<td>35</td>
<td></td>
<td>0.011715</td>
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<tr>
<td>Post ACT Academy Science (n = 36)</td>
<td>22.2222</td>
<td></td>
<td>-2.37</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

Note: Significant when p ≤ 0.25

All thirty-six students that participated in the SJSD ACT Academy were selected to observe the differences between their pre-test performance and their post-test performance on the national ACT test. The mean ACT Science score of the students prior to their participation in the ACT Academy was 21.1389 and the mean ACT Science score of the students after participating in the ACT Academy was 22.2222. The Mean Difference, or difference between the two groups, was -1.0833. The t-test result was -2.37 and the df was 35. The null hypothesis states there is not a significant difference in ACT Science scores based on participation in the ACT Academy. Since the p-value was 0.011715, and the Alpha number was set at 0.25, the null hypothesis must be rejected. Therefore, there is a significant difference in ACT Science test scores based on the participation in the ACT Academy. The post-test with the mean score of 22.2222 scored significantly higher than the pre-test with the mean score of 21.1389.
## Data Collected on Pre-ACT Academy and Post-ACT Academy scores

<table>
<thead>
<tr>
<th>Composite</th>
<th>English</th>
<th>Math</th>
<th>Reading</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>SE</td>
<td>0.7827</td>
<td>0.8050</td>
<td>1.0293</td>
<td>2</td>
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<td>p-value</td>
<td>0.0000</td>
<td>0.0001</td>
<td>0.0000</td>
<td>0.0377</td>
</tr>
</tbody>
</table>


Data Collected on Non-ACT Academy scores
CONCLUSIONS AND RECOMMENDATIONS

The results of this study indicated that there is a significant difference in the ACT Composite score and all four subtests (English, Math, Reading, and Science) based on participation in the ACT Academy. The English subtest had the highest jump from pre-test to post-test (2.2222), while Math came in second place with an increase of 1.3056. Based on the instructional methods presented on how to approach these two subtests, it makes sense that they would have the largest increase. There are a number of multiple-choice strategies that one can teach students that will help them perform well on the English and Math sections. An additional factor that must be considered is that these are the first two tests of the morning, which in turn means that the students are less fatigued while working on these sections. The Science subtest came in third place with an increase of 1.0833. It can be argued that there are multiple factors that can be attributed to their lower growth; there pre-test score was approximately 1.5 points higher than the other subtests, Science is the last test of the day, and the test is based on comprehension. The Reading subtest had the lowest jump from pre-test to post-test (0.8611), which makes sense due to the fact that it is difficult to teach students how to comprehend text during four days of test prep.

There were several limitations in the present study that should be addressed in future research. This sample was predominantly white and middle to low socio-economic status (SES). Future research should examine the relationship between academic performances on the ACT after participation in the ACT Academy in other groups as well. Also, there were twelve seniors that participated in the ACT Academy their junior year of high school that the researcher was unable to obtain their score prior to their participation in the ACT Academy. The researcher was forced to leave their scores out of the study because of being unable to determine the effects of
the ACT Academy without their pre-test scores. This may have affected the data because these
twelve students were possibly more motivated to perform on the ACT based on the fact that they
had already taken the ACT at least two times during their junior year of high school. Future
research should also examine performance after the ACT Academy based on cut scores to
determine if there is a level that achieves more success in regards to the ACT after receiving test
prep.

It is important to further understand that one cannot replace three-four years of
coursework with four days of test prep. As a school district, educators have to send the message
that the best way for students to prepare for the ACT is by taking the appropriate classes in high
school. As proven by the findings in this study, the ACT Academy can help the student’s gain
1.611 Composite points on average, which is still significant. However, that 1.611 will not be
enough to help a student recover from a weak high school schedule.
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