

Running Head: Advanced Degrees and Student Achievement

A STUDY OF WHETHER HAVING A PROFESSIONAL STAFF WITH ADVANCED
DEGREES INCREASES STUDENT ACHIEVEMENT

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ABSTRACT

The purpose of this study was to analyze the relationship between student achievement on Adequate Yearly Progress (AYP) in Communication Arts (CA) and Mathematics (MA) and the percentage of professional staff with advanced degrees in a school district. The research was conducted using seventy-five random Missouri school districts and archived data from DESE was collected to identify numbers of professional staff with advanced degrees and AYP in Communication Arts and Mathematics from the 2010-2011 school year. The findings were analyzed through Microsoft Excel and A Statistical Program (ASP) software. Findings indicate that there is no significant relationship between the percentage of professional staff with advanced degrees and AYP in CA. In contrast, there is a significant relationship between the percentage of professional staff with advanced degrees and AYP in MA. Further studies on this topic are warranted. Additionally, school districts may want to consider the implementation of new ways to increase professional staff salaries instead of education-level based.

INTRODUCTION

Background, Issues and Concerns

In 2001 Congress took aim at teacher quality and sought to raise it, particularly in schools serving low-income students. Through its “highly qualified teacher” provisions, the federal No Child Left Behind Act (NCLB) required all teachers to have “at least a bachelor’s degree, to have full state certification, and to demonstrate knowledge of the subject matter they teach (Center for Public Education, 2009, p.1).” The goal was to ensure that children in all schools would receive the same, high quality education. Beyond receiving a Bachelor in Education degree, majority of school districts provide compensation for continuing education towards a Master of Education (M.Ed.) or further.

Practice under Investigation

The practice under investigation is if having a professional staff with advanced degrees increases Adequate Yearly Progress (AYP) in Communication Arts and Mathematics.

School Policy To Be Informed by the Study

School districts are handing out quite a bit of money in some cases to professional staff as they continue their education. School districts not only increase salary once the degree is completed, but during as a staff member completes different increments of hours towards the degree. The idea is that continuing ones education will make them a more effective teacher; therefore school districts encourage this by increases in salary. Knowing whether or not having a professional staff with advanced degrees has a positive relationship to test scores could greatly affect the hiring process as well as the salary schedule.

Conceptual Underpinnings

No Child Left Behind (NCLB) set a standard for schools that required all teachers to be “highly qualified.” One requirement of a highly qualified teacher is having at least a bachelor degree in education. In today’s society, receiving a bachelor degree is more of a norm than in the past, therefore to be more competitive; adults must continue their education further. In the education world more education is deemed as more effective: Therefore, the more effective the higher the salary.

Statement of the problem.

There is a debate whether continuing education proves to make a teacher more effective in the classroom. Are school districts wasting money by increasing salary based on education level?

Purpose of the study.

The purpose of the study is to ascertain that having an advanced degree helps a teacher become more effective, increasing standardized test scores. The information gained will help school officials with their salary schedules, hiring process and professional development and continuing education for staff.

Research question.

Is there a difference in student achievement on AYP Communication Arts and AYP Mathematics between professional staff with advanced degrees?

Null hypotheses.

H₀. There is no difference between professional staff with advanced degrees and Adequate Yearly Progress (AYP) in Communication Arts and Mathematics.

Anticipated benefits of the study.

The result of this study will inform school officials about the understandings of advanced degrees and if it helps student achievement. It will help school officials know what to look for when hiring new staff and for continuing education on existing staff.

Definition of terms.

DESE: Missouri Department of Secondary and Elementary Education

AYP: Adequate Yearly Progress- The No Child Left Behind Act, instituted in 2001, sets certain goals for school districts to achieve to show student performance. One factor is test scores on the Missouri Assessment Program (MAP) test in elementary school.

NCLB: No Child Left Behind Act of 2001

MAP: Missouri Assessment Program- Standardized tests the all school districts in the state of Missouri are mandated to take.

M.Ed.: Master of Education- a postgraduate academic master's degree awarded by universities in a large number of countries. This degree in education often includes the following majors: curriculum and instruction, counseling, and administration.

Ed.D.: Doctor of Education- is a research doctorate and/or a professional doctorate that prepares the student for academic, administrative, clinical, or research positions in educational, civil, and private organizations.

Summary

School districts encourage staff to continue their education in order to make themselves a more highly qualified and effective teacher. This research will determine whether there is a strong, positive relationship between having a professional staff with advanced degrees and Adequate Yearly Progress (AYP) in Communication Arts and Mathematics.

REVIEW OF LITERATURE

Over 60 percent of all schooling expenditures at the K-12 level are devoted to instructional costs, which consist overwhelmingly of teacher salaries and benefits (Goldhaber & Brewer, 1997). School employees are generally paid through a salary schedule that compensates employees by two factors: years of experience in the system and graduate degrees and/or credits earned toward an advanced degree (Aos, Miller & Pennucci, 2007). Consequently, this has encouraged many to continue schooling past a bachelor's degree (M.Ed., Ed.D, Specialist, etc.) for a pay raise and for researchers to see if giving horizontal raises based on education level is making more effective teachers or is wasting precious money.

NCLB created a sense of urgency for obtaining greater student achievement. What works to improve student outcomes? Research from Aos, Miller and Pennucci (2007) pointed to a clear answer: effective teachers raise student outcomes. While educational researchers disagree on many things, this conclusion has nearly universal support. Effective teachers matter in the academic progress of their students, and their impact can be significant. But what does being an effective teacher really mean? Some equate it to having advanced degree and much knowledge in the subject they are teaching and others to teacher experience and personality. Much research has already been conducted on this issue of advanced degrees and student outcomes.

In the basic models of their research on this topic, Clotfelter, Ladd and Vigdor (2007), included a single variable to indicate whether a teacher has a graduate degree of any type such as a master's that leads to a higher salary, a Ph.D., or another "advanced" degree including those that do not affect the teacher's salary. They concluded that having a graduate degree is not predictive of higher achievement compared to having a teacher without a graduate degree. The results indicate a small positive effect of having a teacher with a master's degree and an

unexpected and surprisingly large negative effect of having a teacher with a Ph.D. They also conducted a second study that yielded virtually no difference between teachers without master's degrees and those who received their master's before entering teaching. However, teachers who received master's degrees after they began teaching appear to be somewhat more effective than those without a master's degree. This pattern, they comment, differs from a pattern that emerged in a previous research they conducted on elementary school teachers. For teachers in the earlier grades, the earning of a master's degree more than five years into teaching was associated with a negative effect on student achievement. Clotfelter, Ladd and Vigdor (2007) interpreted that finding to mean that it was the less effective teachers who chose to pursue master's degrees later in their careers. At the high school level, in contrast, for whatever reason, having a teacher with a master's degree is predictive of higher achievement.

Goldhaber and Brewer (1997) seemed to have similar results in their study but did delve deeper and examined what happens when they add subject specific teacher characteristics to student outcomes. Their model used variables of a teacher that is certified in their subject area, and whether the teacher has a bachelor's or master's degree in his or her subject area. Those variables allowed them to distinguish between teachers who are teaching specific classes and who have a major in that subject, teaching specific classes and are certified in that subject and those who are teaching but do not have subject-specific training. Goldhaber and Brewer's findings indicated that there is little empirical support for compensation policies that automatically reward teachers for additional degrees and experience. The years of teaching experience variable is not statistically significant in any subject area, nor is it statistically significant whether the teacher has a M.Ed. This implies that teachers with an M.Ed. are no more (or less) effective than those without advanced degrees, clearly a counterintuitive finding.

The results for teacher certification are similar in that they find the coefficient on teacher certification to be statistically insignificant (except in English, where teacher certification is significant and negative) (Goldhaber & Brewer, 1997).

Another study, conducted by Harris and Sass in 2007, examined the effects of various types of education and training on the ability of teachers to promote student achievement. They claim that previous studies on the subject have been hampered by inadequate measures of teacher training and difficulties addressing the non-random selection of teachers to students and of teachers to training. Harris and Sass addressed the issues by estimating models that included detailed measures of pre-service and in-service training, a rich set of covariates, and a student, teacher, and school fixed effects. Their results suggest that only two of the forms of teacher training studied influence productivity. First, content-focused teacher professional development is positively associated with productivity in middle and high school math. Second, more experienced teachers appear more effective in teaching elementary math and reading and middle school math. There is no evidence that either undergraduate or graduate training or the scholastic aptitude of teachers influences their ability to increase student achievement (Harris & Sass, 2007).

Aos, Miller and Pennucci (2007) concluded from their draft analysis that there is no consistent relationship between teachers with graduate degrees and increased student outcomes as measure by test scores. This seems true to the countless research articles and findings on this topic of advanced degrees and student achievement. One can't help but think; if more and more research yields these results that salary schedules are in for a change. Although much work remains to fully understand the ways in which training and education affects the ability of teachers to promote student learning, analysis does offer suggestions for shaping future policy

(Harris & Sass, 2007). Goldhaber and Brewer (1997) stated that compensation systems that include measures of teachers' abilities to increase student learning gains will like be a more effective way to identify and reward top performers and ultimately improve teacher quality.

Gordon, Kane and Staiger (2006) states that there are effective certified teachers and there are ineffective certified teachers; similarly, there are effective uncertified teachers and ineffective uncertified teachers. The differences between the stronger teachers and the weaker teachers only become clear once teachers have been in the classroom for a couple of years.

Gordon, Kane and Staiger also recommend that evaluations for teachers should include various measures of teacher performance on the job. While there is no consensus yet on the one best way to evaluate teacher performance and pay, so many measures of teacher performance might be used, such as principal evaluations, parent evaluations, classroom observations, and the number of times a teacher is absent. Also, measures of outputs and performance rather than credentials would be used. Moreover, some measure of "value-added," or the average gain in performance for students assigned to each teacher, would need to be a significant component of that scale.

RESEARCH METHODS

Research Design

A quantitative study was conducted to see if there was a positive correlation between professional staff with advanced degrees and AYP in Communication Arts and Mathematics. The independent variable being tested was professional staff with advanced degrees, while the dependent variable tested was AYP in Communication Arts and Mathematics.

Study Group

Students from seventy-five randomly selected school districts in the state of Missouri who have reported AYP in 2011 in Communication Arts and Mathematics disaggregated by professional staff with advanced degrees were chosen as the group evaluated.

Data Collection and Instrumentation

Archived data from DESE was collected to identify numbers of professional staff with advanced degrees and AYP in Communication Arts and Mathematics from the 2010-2011 school year.

Data Analysis Methods

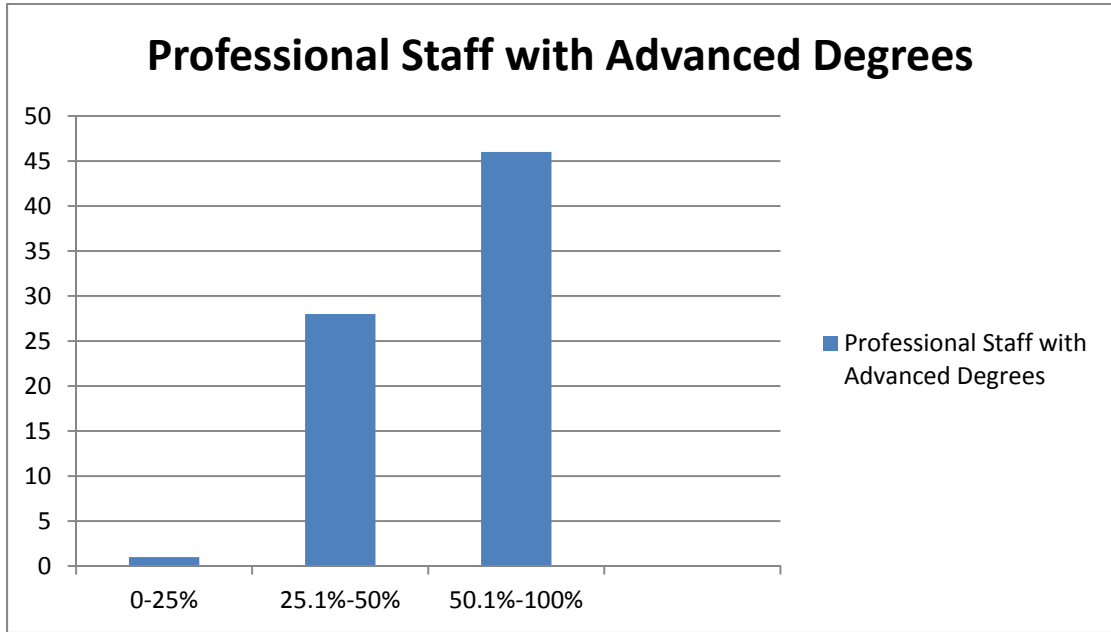
An ANOVA test was conducted to find if there is a significant difference between professional staff with advanced degrees and AYP Communication Arts and Mathematics. The independent variable was broken into three categories: 0-25% professional staff with advanced degrees, 25.1-50% professional staff with advanced degrees and 50.1-100% of professional staff with advanced degrees. The mean, mean D, SD, F, and p-value were concluded from this test. The Alpha level was set at 0.25 to test the null hypothesis: There is not a significant relationship between professional staff with advanced degrees and AYP Communication Arts and Mathematics. A Statistical Package (ASP) software was used to complete the statistical

calculations in this study. Additionally, Microsoft Excel was used to compile some totals used in the research.

FINDINGS

Table 1

Amount of Professional Staff with Advanced Degrees



In Figure 1, the chart describes the seventy-five random schools that were selected for evaluating. There was only 1 district that was described as having 0-25% of their professional staff with advanced degrees. Column two represents the school districts that have 25.1%-50% of its professional staff with advanced degrees. There were 28 school districts that housed 25.1%-50% professional staff with advanced degrees. In the third group, describing the school districts that held 50.1%-100% professional staff with advanced degrees, there were 46 districts.

Table 2

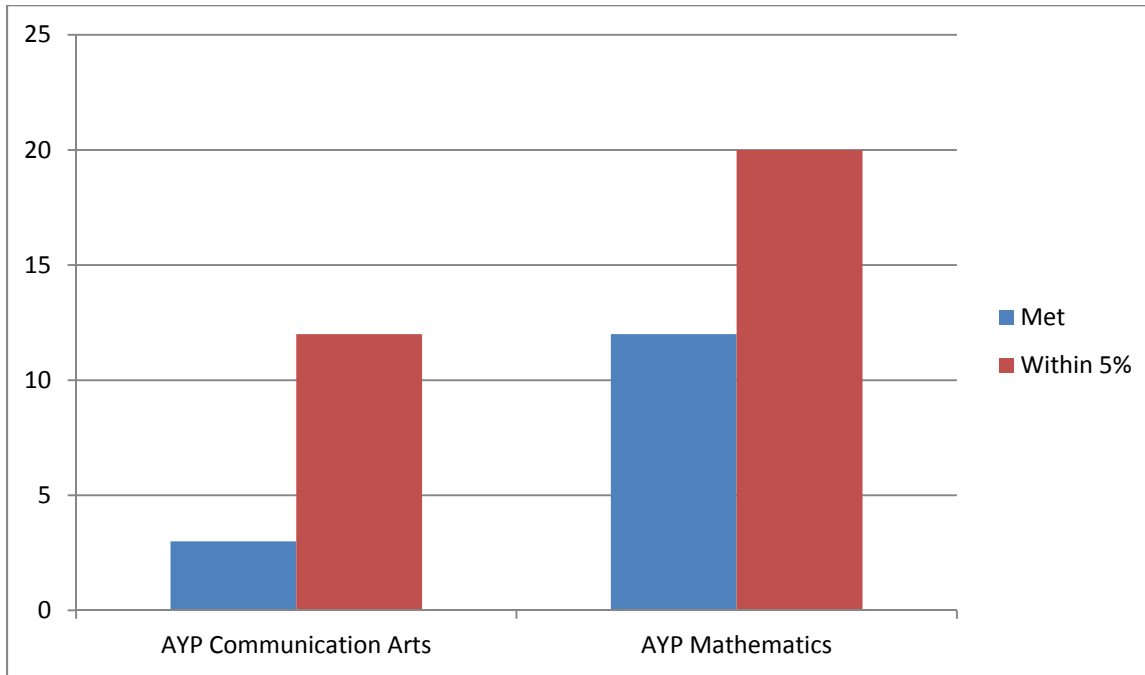
Adequate Yearly Progress Reports from DESE

Figure 2 highlights the reports from DESE on accountability for Adequate Yearly Progress (AYP). The first columns for each content represent the number of schools that met AYP for 2011. The second columns represent the number of schools that scored within 5% of AYP for 2011. In 2011, AYP for Communication Arts (CA) was set at 75.5% proficient. Of the 75 randomly selected schools, there were 3 schools that met AYP in 2011. Additionally, there were 12 schools that were within 5% of the goal of 75.5%. For Mathematics (MA), AYP was set at 72.5% proficient in 2011. There were 12 schools that scored 72.5% of their students or more as proficient. There were also 20 schools that were within the 5% range of 72.5%.

Table 3

Summary of Descriptive Statistics for AYP CA

| Advanced Degrees | <i>N</i> | Mean | <i>SD</i> |
|------------------|----------|--------|-----------|
| 1 | 1 | 64.5 | 5.120 |
| 2 | 28 | 63.096 | 2.743 |
| 3 | 46 | 63.963 | 2.693 |

Seventy-five Missouri school districts were randomly selected for a study to determine if there is a correlation between percent of staff with advanced degrees, an indicator of salary level in a school district, and AYP in Communication Arts. These seventy-five districts were divided into three groups based on the reported percent of salary that has an advanced degree. Group 1 of the sample included the districts with the lowest amount of professional staff with advanced degrees ranging from 0% to 25%. There was only 1 school district out of the 75 that fell in this group. Group 2 of the sample included 28 districts with staff having advanced degrees between 25.1% and 50%. Group 3 of the sample included the 46 districts with the highest amount of professional staff with advanced degrees ranging from 50.1% to 100%. The mean, or average, of the schools with the staff with highest amount of advanced degrees was 63.963, the mean of the middle group was 63.096, and the mean of the lowest was 64.5. The standard deviation, or SD, was 5.120 for Group 1; 2.743 for Group 2; and 2.693 for Group 3. The null hypothesis states that there is not a significant difference between Missouri school districts with higher percentages of professional staff having advanced degrees receiving districts with lower percentages of advanced degrees in relation to AYP in CA. These groups were analyzed and broken down using the One-Way ANOVA test to identify if there was enough of a significant

difference to propose that a school's level of staff with advanced degrees directly impacted the AYP in CA.

Table 4

Summary of ANOVA Test of Significance Results for AYP CA

| Source | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p-value</i> |
|------------------|-----------|-----------|-----------|----------|----------------|
| AYP CA | 4186.58 | 72 | 58.147 | | |
| Advanced Degrees | 13.810 | 2 | 6.905 | 0.119 | 0.888 |

Note: Significance = < 0.25

After dividing the seventy-five Missouri school districts into three categories based on staff with advanced degree percentages, an ANOVA test was completed to challenge the null hypothesis. The null hypothesis stated that there is no significant difference in AYP Communication Arts, based on a school district's professional staff with advanced degrees percentages. The data collected for AYP CA illustrates the SS, sum of squares, was 41876.58; the df, degrees of freedom, was 72; the MS, mean squared, was 58.417. The data collected for advanced degrees presents the SS, sum of squares, was 13.810; the df, degrees of freedom, was 2; and the MS, mean squared, was 6.905. The F, Fisher Ratio, was found to be 0.119. The test reported a p-value of 0.888, which is higher than the alpha level of 0.25; therefore, the null hypothesis is correct. This suggests that school districts' professional staff with advanced degrees percentages do not impact the AYP CA. Since there was no significant difference, a post hoc is not necessary.

Table 6

Summary of Descriptive Statistics for AYPMA

| Advanced Degrees | <i>N</i> | Mean | <i>SD</i> |
|------------------|----------|--------|-----------|
| 1 | 1 | 84.9 | 5.829 |
| 2 | 28 | 63.689 | 3.123 |
| 3 | 46 | 65.089 | 3.066 |

Seventy-five Missouri school districts were randomly selected for a study to determine if there is a correlation between percent of staff with advanced degrees, an indicator of salary level in a school district, and AYP in Mathematics. These seventy-five districts were divided into three groups based on the reported percent of salary that has an advanced degree. Group 1 of the sample included the districts with the lowest amount of professional staff with advanced degrees ranging from 0% to 25%. There was only 1 school district out of the 75 that fell in this group. Group 2 of the sample included 28 districts with staff having advanced degrees between 25.1% and 50%. Group 3 of the sample included the 46 districts with the highest amount of professional staff with advanced degrees ranging from 50.1% to 100%. The mean, or average, of the schools with the staff with highest amount of advanced degrees was 65.089, the mean of the middle group was 63.689, and the mean of the lowest was 84.9. The standard deviation, or SD, was 5.829 for Group 1; 3.123 for Group 2; and 3.066 for Group 3. The null hypothesis states that there is not a significant difference between Missouri school districts with higher percentages of professional staff having advanced degrees receiving districts with lower percentages of advanced degrees in relation to AYP in MA. These groups were analyzed and broken down using the One-Way ANOVA test to identify if there was enough of a significant

difference to propose that a school's level of staff with advanced degrees directly impacted the AYP in MA.

Table 7

Summary of ANOVA Test of Significance Results for AYP MA

| Source | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p-value</i> |
|------------------|-----------|-----------|-----------|----------|----------------|
| AYP MA | 5425.61 | 72 | 75.356 | | |
| Advanced Degrees | 442.328 | 2 | 221.164 | 2.934 | 0.060 |

Note: Significance = < 0.25

After dividing the seventy-five Missouri school districts into three categories based on staff with advanced degree percentages, an ANOVA test was completed to challenge the null hypothesis. The null hypothesis stated that there is no significant difference in AYP Mathematics, based on a school district's professional staff with advanced degrees percentages. The data collected for AYP MA illustrates the SS, sum of squares, was 5425.61; the df, degrees of freedom, was 72; the MS, mean squared, was 75.356. The data collected for advanced degrees presents the SS, sum of squares, was 442.328; the df, degrees of freedom, was 2; and the MS, mean squared, was 221.164. The F, Fisher Ratio, was found to be 2.934. The test reported a p-value of 0.060, which is less than the alpha level of 0.25; therefore, the null hypothesis is rejected. This suggests that school districts' professional staff with advanced degrees percentages does impact the AYP MA. A post-hoc test is necessary to show how the AYP MA is impacted by a school district's amount of professional staff with advanced degrees.

Table 8

Summary Post Hoc Analysis Results for AYP MA

| Advanced Degrees | Advanced Degrees | Mean <i>D</i> | Std. Error | <i>p-value</i> |
|------------------|------------------|---------------|------------|----------------|
| 1 | 2 | 21.211 | 8.834 | 0.019 |
| 1 | 3 | 19.811 | 8.775 | 0.013 |
| 2 | 3 | -1.400 | 2.081 | 0.252 |

Note: Significance = < 0.25

After conducting the One-Way ANOVA test, the null hypothesis was rejected; conclusively, a post hoc analysis was completed to pinpoint where the significant differences lie among the three groups. There was a significant difference in the top two tiers with the lower percentages of staff with advanced degrees, Group 1 and Group 2. Since the p-value was factored at 0.019, which is less than the alpha level of 0.25, the AYP MA was significantly impacted by the level of professional staff with advanced degrees percentages. The mean difference was 21.211 and the standard of error was 8.834. When Group 1, district with the least amount of staff with advanced degrees, and Group 3, the most advanced degrees, were compared, there was the largest significant difference because the p-value was 0.013, which is less than the 0.25 alpha level. The mean D was 19.811 and the standard of error was 8.775. This suggests that there is a significant difference in AYP MA based on the percentage of professional staff with advanced degrees. The specific difference was the lowest percentage of professional staff with advanced degrees group had significantly lower AYP MA scores than the highest percentage group of staff with advanced degrees. There was no significant difference, with a p-value of 0.252, between Group 2, the middle tier, and Group 3, the district with the highest percentage of advanced degrees. The mean difference was -1.400 and the standard of error was

2.081. This post hoc analysis suggests the higher the percentage of professional staff with advanced degrees, the higher the AYP MA scores.

CONCLUSIONS AND RECOMMENDATIONS

The null hypothesis stated that there is no difference between the amount of professional staff with advanced degrees a school district has and AYP in Communication Arts and Mathematics. The results of this study indicate that there is no significant difference between the amount of professional staff with advanced degrees and AYP in Communication Arts. There was no significant difference in any of the areas that were broken down. By contrast, the results of this study for AYP in Mathematics proved to reject the null hypothesis, stating there is a significant difference for Mathematics. There was a significant difference between the amount of professional staff with advanced degrees a school district had and student achievement on AYP Mathematics. However, there was only a significant difference between: Group 1 representing school districts having 0-25% of its professional staff with advanced degrees and Group 2, representing the 25.1-50%, and Group 1 (0-25%) and Group 3 that represents the districts that house 50.1-100% staff with advanced degrees. There was no significant difference between the middle Group 2 and the highest, Group 3.

These findings, particularly, the AYP Communication Arts results, show that there is no correlation between having an advanced degree and student impact. Even though the AYP Mathematics data shows a significant relationship between advanced degrees and student achievement, all p-values were borderline greater than 0.25, meaning the relationship was not a strong one. The results are parallel to the studies completed on this topic from other researchers. While it is true that continuing ones education can be useful, judging salary level based on this doesn't seem to be the most effective for raising student achievement levels. Furthermore, it seems school districts that use salary to encourage continuing education for advanced degrees are going against what school is about: the love of learning.

Based on the data collected in this study, school officials and administrators need to brainstorm other effective ways to determine professional staff salaries. Besides using tenure, or years of service, school districts are shelling out thousands of dollars to professional staff who are working towards an advanced degree beyond bachelors or have obtained an advanced degree. The old thinking that a higher education equates a more effective teacher has been proven incorrect. Research received through this study shows that there are multiple areas that affect student achievement, but a staff with advanced degrees does not.

There are several areas warranting further study. This set of data was compiled from a small data set of only seventy five Missouri school districts. Tests need to be completed across the states to see if regional differences occur. Research could be broken down by grade level, AYP scores and percent of professional staff with advanced degrees to see if there is an age group where it is significant as well.

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