RUNNING HEAD: Predictive Assessments

PREDICTIVE POWER OF STUDENT PERFORMANCE ON THE MAP TEST BASED ON

STUDENT PERFORMANCE FROM ACUITY PREDICTIVE C ASSESSMENT

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Abstract

The purpose of this study was to analyze if there is a positive predictive correlation between the Acuity predictive C formative assessment for English Language Arts (ELA) and for Mathematics in grades 3-5 within the district. The research includes findings that answer the questions, " Is there predictive power of student performance on the MAP test based on student performance on the Acuity predictive C formative assessment?", and "Is there a difference in predictive power amongst the three different grade levels, third, fourth and fifth grade?". The research was conducted by using spring 2013 MAP data that was published by the Missouri Department of Elementary and Secondary Education along with predictive C formative assessment scores from Acuity by CTB/McGraw-Hill. The findings were analyzed through Microsoft Excel and A Statistical Program (ASP) software. The findings indicate that there is significant power of prediction between the Acuity prediction and the MAP scores for both areas of math and ELA.

Introduction

Background, Issues and Concerns

With a great emphasis being placed on building and district Missouri Assessment Program (MAP) scores every spring, CTB/McGraw-Hill, a leading publishing company for assessment and academic assessment solutions has developed an assessment program, called Acuity. Acuity is a formative assessment solution that is helping teacher's measure student performance and use assessment data gathered from predictive assessments to provide individualized instruction that is targeted towards individual student needs.

Formative assessments are designed in layers. Acuity Predictive A taken in the Fall is designed with 2/3 previous grade level content and 1/3 current grade level material. In the Winter, Acuity Predictive B is designed with 2/3 current grade level material and 1/3 of content coming from previous grade level. Then in the Spring, Acuity Predictive C is designed with 100% current grade level material. This Predictive C formative assessment provides data that is predicting student scores on the Missouri Assessment Program (MAP) that students will be assessed on later that spring.

Many have concerns that the Predictive assessments aligned throughout the school year do not accurately predict student state assessment scores. Therefore, using data gathered from the Department of Elementary and Secondary Education (DESE), MAP scores for students in grades third through fifth were gathered for the 2012-2013 school year for the entire district as well Acuity C predictive scores for the spring of 2013 for students in grades third through fifth for both math and ELA.

Practice under Investigation

The practice under investigation will be looking at Acuity scores for third through fifth grade students on their spring predictive C formative assessment. There will be an investigation to see if there is a significant correlation between the Acuity predictive C assessment and the MAP scores for third through fifth grade students in the district for the content areas of math and ELA. This will be determined based on data provided by the Department of Elementary and Secondary Education (DESE) and the Acuity predictive C formative assessment scores compiled from CTB McGraw-Hill program Acuity for the areas of math and ELA. The study will provide information on the correlation of the Acuity predictive C scores and the MAP scores for math and ELA content areas.

School Policy to be Informed by Study

Every building and school district is focused on meeting Annual Yearly Progress (AYP) standards on the Missouri Assessment Program (MAP) at the end of the year, so if there is a significant difference in test scores from the Acuity predictive assessment and the MAP scores, teachers and administration should take a look at the program and the fidelity of the implementation of the program throughout the three buildings within the district that data was collected.

Conceptual Underpinning

In theory the Acuity program will show predictive power in student performance on the spring MAP assessment for students in grades third through fifth in the areas of math and ELA for grades third through fifth.

While the Acuity program from CTB/McGraw-Hill offers a variety of data reports, the data allows teachers to individualize instruction for every student as well as predict student state

MAP scores for areas of math, ELA, and science. While these are options the program provides, this could look differently throughout classrooms, buildings, and even districts. A program implemented with fidelity at one building may provide data that shows a strong correlation between the predictive C formative assessment from Acuity and the MAP scores for the school year of 2012-2013. On the other hand, a building who is not implementing the program with fidelity may not show the same correlation between the two. There are many other factors that may affect the correlation between Acuity predictive C assessment scores and the MAP scores. Students within the district come from different areas. The largest building, catering to a suburban community serves about 550 students with a free or reduced lunch population of 44.2% of the population. Another building in district caters to an urban setting and serves about 460 students with a free or reduced lunch population of 58.4%. The last elementary building in district caters to a rural community and serves about 230 students with a free or reduced lunch population of 47.7%. The socio-economic status of a particular building may also have an impact on the correlation or benefit aligned with the Acuity program from CTB/McGraw-Hill assessment program.

Many other factors come into play when looking at the positive correlation between the CTB/McGraw-Hill Acuity Predictive C scores and the MAP scores from the 2012-2013 school year. While each building is directed by the same instruction technology coach, the implementation process may look different from building to building within the district. Some buildings have students taking both the constructive response portion for the math, ELA and science alongside the computerized portion. Along with the constructive response portion, these are scored by individual classroom teachers using a rubric. The grading for this particular section is more subjective than the multiple choice section that is taken on the computer for all areas of

math, ELA, and science. While the constructive response portion of the assessments is only a minimal part of the formative assessment for predictive C, it is still a part that is scored by different individuals throughout the classrooms, grade levels, and buildings in the district.

With any assessment formative or summative there are other factors that come into play that effect the way the student performs on their assessment piece rather computerized with multiple choice questions or through written constructive response questions. Students come from many different households, structures and ways of life. Therefore, students may have been faced with problems or issues before the school day that may have affected the way they performed on the predictive C formative assessment for either math, ELA, and/or science portion. Also, the computerized portion of the test may have allowed students to simply click on a response to a question before they took adequate time to read through the problem, problem solve and select the best choice or answer provided. All these are issues that may have directly impacted the outcome of the prediction scores for students in grades third through fifth in this particular data set for the content areas of math and ELA.

Statement of the Problem

If there is no correlation between the Acuity predictive C formative assessments and the MAP scores for 2012-2013, teachers and administration need to know how to better implement the program or choose to use a different intervention system to directly target individualized instruction for students throughout the district.

Purpose of the Study

The purpose of the study is to ascertain administration about the Acuity program and the correlation with student scores on the MAP assessment for grades 3-5. The information gained will help administrators and instructional coaches know how the Acuity program affectively or

ineffectively affected the MAP test scores within the Excelsior Springs School District for the school year of 2012-2013.

Research Question(s)

RQ *1:* Is there predictive power of student performance on the MAP test based on student performance on the Acuity predictive C formative assessment?

RQ *2:* Is there a difference in predictive power amongst the three grade levels, third, fourth, and fifth?

Null Hypothesis(es)

Ho 1: There is no predictive power of student performance on the MAP test based on student performance on the Acuity Predictive C formative assessment.

Ho 2: There is no difference in predictive power amongst the three grade levels, third, fourth, and fifth.

Anticipated Benefits of the Study

The results of this study will inform the school district administrators and instructional coaches in understanding the direct effect the Acuity program is having on student achievement within the school district and buildings. It will help the district administrators and instructional coaches know if the program is beneficial to student achievement.

Definition of Terms

MAP – Missouri Assessment Program – assessment given annually each spring to students in grade 3-8 in the subject areas of communication arts and mathematics and science for grade 5 and 8.

AYP – Annual Yearly Progress – Certain goals are set for each school district to achieve to show student performance with MAP scores being a strong source of data. The No Child Left Behind Act that went into effect in 2000 required this from school districts.

DESE – Department of Elementary and Secondary Education

Acuity – Program developed by CTB/McGraw-Hill to provide data to teachers and administrators to provide interventions and individualized instruction for each student in the building. The data also tracks a student over the course of a year and provides predictive assessments that allow administrators and teachers to see where their students are predicted to score on the MAP test in the spring.

MAP-A – Missouri Assessment Program Alternative – Students with an Individualized Educational Plan (IEP) receive an alternative assessment with modifications for the communication arts, math or science portion of the regular Missouri Assessment Program test.

IEP – Individualized Educational Plan – Students with special needs or disabilities qualify for an Individualized Educational Plan that provides students with services and accommodations to support their learning within the regular educational classroom or special educational classroom or through services.

Summary

A study was conducted to see if there was a significant correlation between the Acuity predictive C formative assessment and the MAP scores for 2012-2013 for students in grade three through fifth throughout the district focused on the content areas of math and ELA. If the regression analysis concludes there was a significant correlation, teachers should continue using Acuity and the interventions and individualized instruction provided to create lessons focused on identified instructional content areas as well as provide interventions as suggested according to data. Since there is a group of students in the third through fifth grade category who do not take the MAP assessment because of an Individual Education Plan (IEP) or because they are Missouri Assessment Program Alternative (MAP-A), this is reflected in what students take the Acuity predictive assessments. After this study is completed, school districts can benefit from knowing if the Acuity program by CTB/McGraw-Hill is worth the investment for a district to provide interventions and individualized instruction that supports student growth academically.

Review of Literature

The Acuity system designed by CTB/McGraw-Hill is an award-winning system that is leading the way in today's educational assessment and reporting (AcuityForSchools 2011). The mission of CTB/McGraw-Hill is "to help the teacher help the child". CTB/McGraw-Hill delivers through the Acuity program which provides educators with three predictive assessments, four diagnostic assessments, per grade level in the content areas of English language arts, math, and science, depending on state testing standards. From the diagnostic and predictive assessments, educators can use the program to quickly run reports at the student, classroom, school, district and multi-district level in order to gather data to guide instruction. Along with the assessments, and reports, instructional resources for guided practice and intervention are provided through the use of the program. These resources may help educators plan strategic interventions or lessons that apply directly to their targeted group of students depending on the data these educators receive from the report from the assessment that was given.

CTB/McGraw-Hill draws on 80 or more years of experience in the field of writing assessments, providing reports and creating a system that is powerful in aiding teachers in reaching the needs of all students in all content areas. According to CTB/McGraw-Hill, "to

create even one single item, meticulous planning and development is required. The

process starts with careful construction by assessment and content experts, followed by

an examination for bias and fairness, and an evaluation to ensure reliable inferences can

be drawn from the item about student strengths and instructional needs. Empirical data

from students in your state are used to select the best functioning items for final Acuity

forms. Numerous item reviews, specific to state content standards, ensure accurate skill

assessment and measurement of student growth relative to state standards"

(AcuityForSchools 2011, p.5).

While the focus of the research project was to determine if the Acuity predictive C formative assessment positively predicted Spring 2013 MAP scores for both english language arts and math, the majority of research found today is on the impact the program makes in the student's growth. Acuity is one of the most powerful attributes of the Acuity program is the programs ability to indicate individual student's growth and tracking their progress towards meeting the state's end of the year goal for each grade level and content area (AcuityForSchools 2011). Throughout the course of the year three predictive assessments are given to students in the areas of english language arts, math, and science. These content areas are all subjective of the state's standards in assessment. For instance, in Missouri, third grade students are assessed in english language arts, and math, therefore, Acuity tests students in third grade in those two particular content areas. While students in Missouri in fifth grade are assessed by the state in english language arts, math, and science. Therefore, Acuity assesses fifth graders on these three content areas.

The predictive assessments are designed in a gradual release manner. At the beginning of the year students take predictive A which is designed with 2/3 of content from the previous grade level and 1/3 of the content from the current grade level. On the predictive B assessment, 1/3 of the content is from the previous grade level and 2/3 of the content is from the current grade level. The final predictive assessment, predictive C is designed with 100% of the content being on grade level. Each of the three predictive assessments is designed to be given six to eight weeks apart and prior to the state accountability assessment (CTB McGraw-Hill, 2008).

The predictive assessments are each designed with approximately 35 select-response questions through a computer Acuity program or written and two constructed-response items that are provide in a written manner. The selected-response items are graded through the computer program if taken on the computer, while the constructed-response items are assessed through the use of a rubric and the individual classroom teacher. The predictive C assessment is the assessment that is predicting the student's state performance level. While the Acuity program not only helps students prepare for the state testing it also provides teachers with powerful information on where the majority of students need to improve, as well as "preserving" time to provide intervention on content or standards that students need the most (Acuity for School 2011).

While there are numerous other tools and resources embedded inside the Acuity program, the diagnostic and predictive assessments are the main sources of information for educators today focused on provide strategic instruction to meet the needs of each and every student for each and every content area. Multiple reports can be run off to guide educators in creating lessons and interventions around each students needs. Reports can also be run off to show parents and students. Student growth reports or portfolio reports can show a student's progress over the course of the year(s), depending on the time frame the district has been using the program. These are great reports to include in conferences with parents or to show in order for parents and students to get a visual of where they are in each content area and where the end of the year goal is (CTB McGraw-Hill 2009).

Using the predictive assessments to determine how students will perform on their state assessments is a huge tool or resource provided through the Acuity program. The Acuity program provides scaled scores throughout the predictive assessments to measure students

longitudinal growth in each content area within and across grade levels pertaining to the student

(CTB/McGraw-Hill 2011). Scaled scores provide the ability to add, subtract, and average across

test levels without worrying about student characteristics or the time of the year the predictive

assessment was given. Scale scores help to accurately compare data in a manner that raw scores

or percentiles cannot provide (CTB/McGraw-Hill 2011). Focused on prediction studies,

according to CTB/McGraw-Hill,

> "To provide predictions, Acuity assessment results are matched with student
>
> NCLB test data. This matching enables Acuity to provide predictive performance levels
>
> and confidence bands that indicate the expected level of achievement on the state NCLB
>
> test. The prediction includes the corresponding performance level on the state exam (e.g.
>
> Below Basic, Basic, Proficient, or Advanced or other performance descriptions are used
>
> on state exam)." (CTB/McGraw-Hill 2011, p. 2).

This data is displayed in a "concordance table" which provides information on the expected

performance level of each student based on empirical research completed by CTB in order to

provide the predictive achievement level, confidence band and scale score per content area

(CTB/McGraw-Hill 2011).

CTB/McGraw-Hill, *The Efficacy of the Acuity Predictive Assessment Research Design:*

A Review of Empirical Data Studies, releases information on the power of the Acuity predictions

through the predictive assessments. According to CTB/McGraw-Hill, "matched data from each

> Acuity Predictive Assessment and the state NCLB assessment were gathered from a
>
> sample of districts in each state. The results, provided in Table 4, indicate average
>
> correlations of the Acuity form and NCLB scores between .75 and .80, which are strong
>
> associations for tests of this length. This indicates that the predictive relationship between

Acuity and the state test is good and that Acuity Predictive Assessments can provide and

early indicator of subsequent performance on the state test" (CTB/McGraw-Hill 2009, p.

3).

Table 4. Average Correlations Between Acuity Forms and State Summative NCLB Test

Average Correlations Grades 3-8				
	Colorado		Missouri	
Form	ELA	Math	ELA	Math
A	0.77	0.78	0.75	0.77
B	0.77	0.8	*	*

* Study not yet conducted

Since the launch of the Acuity program, many districts have seen a positive correlation

between the Acuity predictive assessments performance level predictions along with their state

testing outcomes. Not only have districts, buildings, and classrooms seen positive predictability

between the Acuity program and their state testing but the program has allowed teachers to

design their instruction strategically to target learning standards that are at the utmost

importance; targeting learning standards that need the most critical intervention necessary

(CTB/McGraw-Hill 2009).

On November 11, 2010 it was released by CTB/McGraw-Hill that test data was showing

evidence that schools that were using the Acuity program were showing increases on their state

assessments (Engle, 2010). Inside the article, *Missouri Schools Using CTB's Acuity Assessment*

Show Significant Improvements on MAP Test Scores", it stated, "The latest data,

>   from the 2009-2010 school year, shows that districts using Acuity are commonly
>
>   reporting improvements in MAP scores of 5-10% over the year, with some schools
>
>   showing even greater progress" (CTB/McGraw-Hill 2010, p. 1).

For instance, inside the article the Aurora School District is represented and their results of using the Acuity program are shared. The district who served more than 2,000 rural K-12 students during the 2009-2010 school year experienced improvements in MAP scores since implementing the Acuity program. In the article it discusses these improvements by saying, "For example,

> results in 5th grade mathematics showed that students coring at the "proficient" and "advanced" levels increased from 42% to 60% from 2009 to 2010. Similarly, results in 5th grade communications arts showed an improvement of 47% to 53% at the proficient/advanced levels" (CTB/McGraw-Hill 2010, p. 1).

This particular district is using data provided by Acuity to group students based on student's ability and designing intervention groups that provide instruction catered to each individual groups needs.

Another district discussed inside the article is an urban district that serves more than 10,000 students during the 2009-2010 school year. The district has been using the program since 2006 (Engle, 2010). Within the time the district has been using the Acuity program, "At the district-, example results in 7th grade communications arts showed that students scoring at the "proficient" and "advanced" levels increased from 65% to 70% from 2009 to 2010. Similarly, results in 6th grade mathematics showed an improvement of 65% to 72% at the proficient/advanced levels. While this particular research focused on the improvement of instruction, this also provides support on how teachers are using the predictive assessments to gather data and information about where their students are and what the end of the year goal is for each particular grade level and content area (Engle, 2010).

With a shift to the Common Core State Standards, CTB/McGraw-Hill developed a webinar series that was designed to provide not only technical advice but also guidance for the

development of assessment programs both local and state (CTB/McGraw-Hill). According to

Ellen Haley, president of CTB/McGraw-Hill, "The role of state and local assessment in the

teaching-learning process is evolving rapidly as the result of important initiatives such as

Common Core State Standards, which pose some challenges to states as they redesign

their assessment programs to meet new requirements. CTB offered the webinar series to

bring together the best minds in the assessment field, to evaluate and discuss the

implications to state assessment programs. These topical seminars, with input from CTB

research professional and state assessment experts from across the country, will help

educators understand these challenges and develop the next generation of assessment

programs" (Engle, 2010, p. 2).

Research Methods

Research Design

Data was collected from the DESE website and the Acuity program to see if there was a correlation between the predictive C formative assessment scores and the student's performance on the MAP assessment for 2012-2013 school year in the areas of math and ELA. The independent variable being tested was Acuity's predictive C formative assessment scores, while the dependent variable tested was Missouri Assessment Program scores for third through fifth grade students in both content areas of math and ELA. If the correlation is found to be significant between Acuity and MAP scores, teachers should continue to implement the Acuity program with fidelity.

Study Group Description

Students from the elementary level within a given district were selected in reviewing data from Acuity predictive C formative assessments as well as the 2013 MAP scores for students in grades third through fifth within the district in both content areas of math and ELA. Amongst the three elementary buildings in the district two are barely over 50% for their free or reduced population. The other elementary building is near 75% of students on free or reduced lunch. Across the board the buildings are primarily white with a minimal percent of students coming from different ethnic backgrounds. The three buildings differ in their setting. One building is located in the suburban area of the community, another building is located in the rural community and the final building is located in the urban community. The three different buildings have a vast difference in students way of getting to a from school due to their environment within the community. The urban community has many students whom walk to and from school, while the rural building has many students whom are car riders or bus riders. The

suburban building is very equal in their setting of students traveling to and from school by car, walking or on the bus.

Data Collection and Instrumentation

Recent data released from DESE was collected to identify MAP scores for students in grades third through fifth for the 2012-2013 school year in the areas of math and ELA, along with the data retrieved from the Acuity program's predictive C formative assessments in the same areas math and ELA.

Data was compiled in the form of performance levels determined by the state MAP assessment, advanced, proficient, basic, and below basic. In order to accurately run a simple linear regression data was converted into numbers. Therefore, advanced became a 4, proficient became a 3, basic became a 2, and below basic became a 1. The numbers would allow the simple linear regression to output data that would represent the study accurately to determine whether the Acuity predictive C formative assessment for math and ELA positively predicted the MAP scores for math and ELA content areas.

Statistical Analysis Methods

A regression analysis was conducted to find if there is a significant correlation between the Acuity predictive C formative assessment scores and the MAP scores for the school year of 2012-2013 for students in grades third through fifth within the same district in the content areas of math and ELA. The beta coefficient, R^2, standard error estimation, F, p-value were concluded from this test. The Alpha Level was set at 0.1 to test the null hypothesis: There is no predictive power of student performance on the MAP test based on student performance on the Acuity assessment

Findings

To determine if the Acuity predictive C formative assessment positively predicts students

performance in the areas of math and ELA on the MAP test, data was compiled from students

predictive C formative assessment scores from Acuity and their spring 2013 MAP data.

Data was collected from the three elementary buildings within the district in both areas of

math and ELA. A simple linear regression was conducted to determine whether the Acuity

predictive C formative assessment positively predicted student MAP scores for the spring 2013

in both areas of math and ELA. The following tables and narratives provide an organized

summary of the findings based on raw data found on Missouri DESE website in 2013 and the

prior year reports accessed through the Acuity program. There is only one year of data to look at

for the Acuity predictive C formative assessment since the 2012-2013 school year was the first

year of using the Acuity program by CTB/McGraw-Hill.

Table 1: Regression Analysis for 3rd grade Acuity C Math vs. 3rd grade MAP math

Simple Linear Regression Analysis (SLR) Research Question: Can the 3rd grade Acuity C

formative assessment for math positively predict MAP math scores for 3rd grade students?

Model: MAP = 0.686212 3rdMathAcuity + 0.909906 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	0.69				
3MathAcuity	0.68	0.35	0.59	103.06	1.17E-19

Alpha = 0.1

As shown in Table 1, simple linear regression was calculated predicting 3rd grade

students Math MAP scores based on their spring Acuity C math formative assessment score. A

significant regression equation was found ($F(1/192) = 103.06$, $p < 0.001$), with an R^2 of 0.35.

Subjects' predicted Math MAP score is equal to 0.91 + 0.69 Acuity C math formative assessment. Subjects' average math MAP increased 0.69 points for an increase of one Acuity C math formative assessment score with an SEE of +/- 0.59.

Can the math MAP scores for third grade students be predicted from the Acuity C math formative assessment scores?

Model Power:

R squared (0.35) indicated a less than practical model that accounts for about 35% of the variance between the two variables. Standard Error of the Estimate (SEE) finding suggests that the predicted math MAP is accurate +/- 0.59 points at one standard deviation. It can be concluded that the model has a moderate-high power and accuracy.

Model Significance:

F (103.06) has high relative value when compared to zero. This indicates that there is little change that a Type One Error would be made if the null hypothesis was rejected. Sig. (0.00) indicates that we can be 100% sure that a Type One Error will not occur. The SLR model is significant. It can be concluded that the model null hypothesis can be rejected with great confidence. Therefore the math MAP score can be predicted from the Acuity C math formative assessment score.

SLR Model:

For every point predicted on the Acuity C math formative assessment, the third grade student's math MAP score will be scored at 0.31 points below the predicted level of their Acuity C formative assessment prediction.

Table 2: Regression Analysis for 4th grade Acuity C Math vs. 4th grade MAP math

Simple Linear Regression Analysis (SLR) Research Question: Can the 4th grade Acuity C

formative assessment for math positively predict MAP math scores for 4th grade students?

Model: MAP = 0.822768 4thMathAcuity + 0.503938 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	0.50				
4MathAcuity	0.82	0.47	0.50	159.05	1.54E-26

Alpha = 0.1

As shown in Table 2, simple linear regression was calculated predicting 4th grade

students Math MAP scores based on their spring Acuity C math formative assessment score. A

significant regression equation was found ($F(1/170) = 159.046$, $p < 0.001$), with an R^2 of 0.47.

Subjects' predicted Math MAP score is equal to 0.50 + 0.82 Acuity C math formative

assessment. 4th grade's student average for the math MAP increased 0.82 points for an increase

of one Acuity C math formative assessment score with an SEE of +/- 0.50.

Can the math MAP score for fourth grade students be predicted from the Acuity C math

formative assessment score?

Model Power:

R squared (0.47) indicated a less than practical model that accounts for about 47% of the

variance between the two variables. Standard Error of the Estimate (SEE) finding suggests that

the predicted math MAP is accurate +/- 0.50 points at one standard deviation. It can be

concluded that the model has a moderate-high power and accuracy.

Model Significance:

F (159.05) has high relative value when compared to zero. This indicates that there is little

change that a Type One Error would be made if the null hypothesis was rejected. Sig. (0.00)

indicates that we can be 100% sure that a Type One Error will not occur. The SLR model is

significant. It can be concluded that the model null hypothesis can be rejected with great

confidence. Therefore the math MAP score can be predicted from the Acuity C math formative

assessment score.

SLR Model:

For every point predicted on the Acuity C math formative assessment, the fourth grade student's

math MAP score will be scored at 0.18 points below the predicted level of their Acuity C

formative assessment prediction performance level.

Table 3: Regression Analysis for 5th grade Acuity C Math vs. 5th grade MAP math

Simple Linear Regression Analysis (SLR) Research Question: Can the 5th grade Acuity C

formative assessment for math positively predict MAP math scores for 5th grade students?

Model: MAP = 0.692192 5thMathAcuity + 0.728864 CNST

Source	Beta Coef.	R²	SEE	F	p-value
Constant	0.73				
5MathAcuity	0.69	0.60	0.47	282.71	2.17E-39

Alpha = 0.1

As shown in Table 3, simple linear regression was calculated predicting 5th grade

students Math MAP scores based on their spring Acuity C math formative assessment score. A

significant regression equation was found ($F(1/189) = 282.706$, $p < 0.001$), with an R² of 0.60.

Subjects' predicted Math MAP score is equal to 0.73 + 0.69 Acuity C math formative

assessment. 5th grade's student average for the math MAP increased 0.69 points for an increase

of one Acuity C math formative assessment score with an SEE of +/- 0.47.

Can the math MAP score for fifth grade students be predicted from the Acuity C math formative

assessment score?

Model Power:

R squared (0.60) indicated a less than practical model that accounts for about 60% of the

variance between the two variables. Standard Error of the Estimate (SEE) finding suggests that

the predicted math MAP is accurate +/- 0.47 points at one standard deviation. It can be

concluded that the model has a moderate-high power and accuracy.

Model Significance:

F (282.71) has high relative value when compared to zero. This indicates that there is little

change that a Type One Error would be made if the null hypothesis was rejected. Sig. (0.00)

indicates that we can be 100% sure that a Type One Error will not occur. The SLR model is

significant. It can be concluded that the model null hypothesis can be rejected with great

confidence. Therefore the math MAP score can be predicted from the Acuity C math formative

assessment score.

SLR Model:

For every point predicted on the Acuity C math formative assessment, the fifth grade student's

math MAP score will be scored at 0.31 points below the predicted level of their Acuity C

formative assessment prediction.

Table 4: Regression Analysis for 3rd grade Acuity C ELA vs. 3rd grade MAP ELA

Simple Linear Regression Analysis (SLR) Research Question: Can the 3rd grade Acuity C

formative assessment for ELA positively predict MAP ELA scores for 3rd grade students?

Model: MAP = 0.676346 3rdELAAcuity + 0.993184 CNST

Source	Beta Coef.	R²	SEE	F	p-value
Constant	0.99				
3ELAAcuity	0.68	0.36	0.69	107.31	2.94E-20

Alpha = 0.1

As shown in Table 4, simple linear regression was calculated predicting 3rd grade

students ELA MAP scores based on their spring Acuity C math formative assessment score. A

significant regression equation was found $(F(1/192) = 107.305, p < 0.001)$, with an R^2 of 036.

Subjects' predicted ELA MAP score is equal to 0.99 + 0.68 Acuity C ELA formative

assessment. 3rd grade's student average for the ELA MAP increased 0.68 points for an increase

of one Acuity C math formative assessment score with an SEE of +/- 0.69.

Can the ELA MAP score for third grade students be predicted from the Acuity C ELA formative

assessment score?

Model Power:

R squared (0.36) indicates a 36% of variance between the two variables. Standard Error of the

Estimate (SEE) finding suggests that the predicted ELA MAP is accurate +/- 0.69 points at one

standard deviation. It can be concluded that the model has a moderate-high power and accuracy.

Model Significance:

F (107.31) has high relative value when compared to zero. This indicates that there is little

change that a Type One Error would be made if the null hypothesis was rejected. Sig. (0.00)

indicates that we can be 100% sure that a Type One Error will not occur. The SLR model is significant. It can be concluded that the model null hypothesis can be rejected with great confidence. Therefore the ELA MAP score can be predicted from the Acuity C ELA formative assessment score.

SLR Model:

For every point predicted on the Acuity C ELA formative assessment, the third grade student's ELA MAP score will be scored at 0.32 points below the predicted level of their Acuity C formative assessment prediction.

Table 5: Regression Analysis for 4th grade Acuity C ELA vs. 4th grade MAP ELA

Simple Linear Regression Analysis (SLR) Research Question: Can the 4th grade Acuity C formative assessment for ELA positively predict MAP ELA scores for 4th grade students?

Model: MAP = 0.756937 4thELAAcuity + 0.705055 CNST

Source	Beta Coef.	R²	SEE	F	p-value
Constant	0.71				
4ELAAcuity	0.76	0.49	0.62	171.15	7.03E-28

Alpha = 0.1

As shown in Table 5, simple linear regression was calculated predicting 4th grade students ELA MAP scores based on their spring Acuity C ELA formative assessment score. A significant regression equation was found (F(1/179) = 171.152, p < 0.001), with an R² of 049. Subjects' predicted ELA MAP score is equal to 0.71 + 0.76 Acuity C ELA formative assessment. 4th grade's student average for the ELA MAP increased 0.76 points for an increase of one Acuity C math formative assessment score with an SEE of +/- 0.62.

Can the ELA MAP score for fourth grade students be predicted from the Acuity C ELA

formative assessment score?

Model Power:

R squared (0.49) indicates a 49% of variance between the two variables. Standard Error of the

Estimate (SEE) finding suggests that the predicted math MAP is accurate +/- 0.62 points at one

standard deviation. It can be concluded that the model has a moderate-high power and accuracy.

Model Significance:

F (171.15) has high relative value when compared to zero. This indicates that there is little

change that a Type One Error would be made if the null hypothesis was rejected. Sig. (0.00)

indicates that we can be 100% sure that a Type One Error will not occur. The SLR model is

significant. It can be concluded that the model null hypothesis can be rejected with great

confidence. Therefore the ELA MAP score can be predicted from the Acuity C ELA formative

assessment score.

SLR Model:

For every point predicted on the Acuity C ELA formative assessment, the fourth grade student's

ELA MAP score will be scored at 0.24 points below the predicted level of their Acuity C

formative assessment prediction.

Table 6: Regression Analysis for 5th grade Acuity C ELA vs. 5th grade MAP ELA

Simple Linear Regression Analysis (SLR) Research Question: Can the 5th grade Acuity C formative assessment for ELA positively predict MAP ELA scores for 5th grade students?

Model: MAP = 0.658755 5thELAAcuity + 0.929961 CNST

Source	Beta Coef.	R^2	SEE	F	p-value
Constant	0.93				
5ELAAcuity	0.66	0.46	0.58	158.56	8.50E-27

Alpha = 0.1

As shown in Table 6, simple linear regression was calculated predicting 5th grade students ELA MAP scores based on their spring Acuity C ELA formative assessment score. A significant regression equation was found ($F(1/189) = 158.558$, $p < 0.001$), with an R^2 of 0.46. Subjects' predicted ELA MAP score is equal to 0.93 + 0.66 Acuity C ELA formative assessment. 5th grade's student average for the ELA MAP increased 0.66 points for an increase of one Acuity C math formative assessment score with an SEE of +/- 0.58.

Can the ELA MAP score for fifth grade students be predicted from the Acuity C ELA formative assessment score?

Model Power:

R squared (0.46) indicates that a 46% of variance between the two variables. Standard Error of the Estimate (SEE) finding suggests that the predicted math MAP is accurate +/- 0.58 points at one standard deviation. It can be concluded that the model has a moderate-high power and accuracy.

Model Significance:

F (158.56) has high relative value when compared to zero. This indicates that there is little

change that a Type One Error would be made if the null hypothesis was rejected. Sig. (0.00)

indicates that we can be 100% sure that a Type One Error will not occur. The SLR model is

significant. It can be concluded that the model null hypothesis can be rejected with great

confidence. Therefore the ELA MAP score can be predicted from the Acuity C ELA formative

assessment score.

SLR Model:

For every point predicted on the Acuity C ELA formative assessment, the fifth grade student's

ELA MAP score will be scored at 0.34 points below the predicted level of their Acuity C

formative assessment prediction.
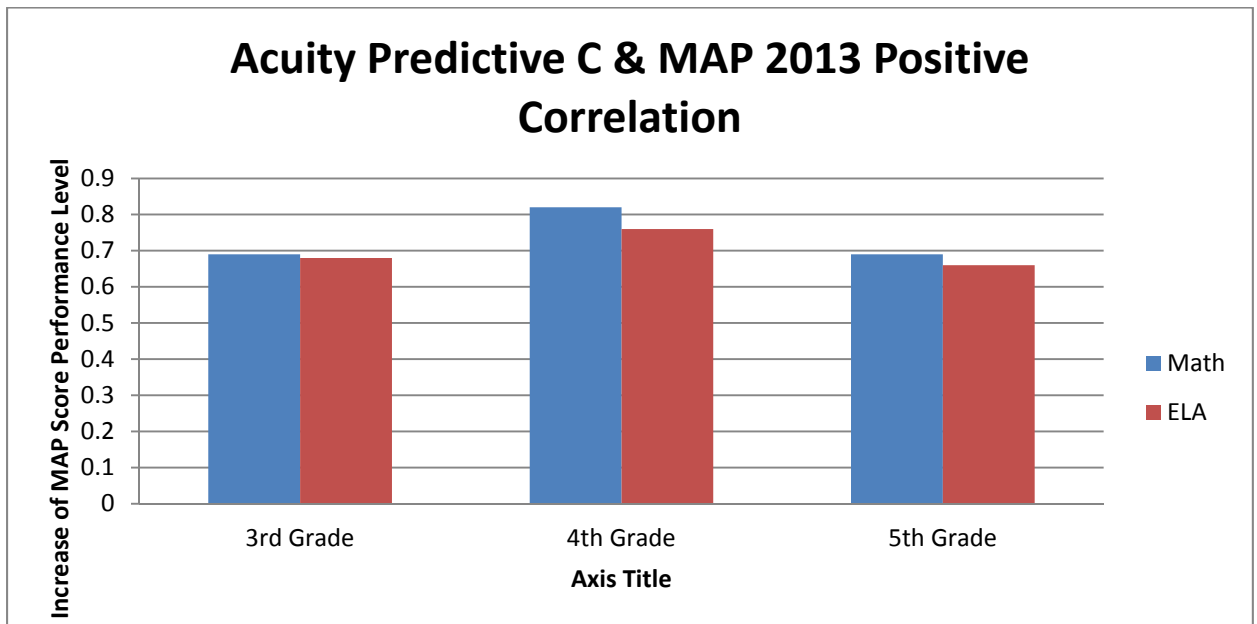
The chart above represents for the Acuity predictive C formative assessments positive

correlation to the Spring 2013 MAP scores for both english language arts and math for students

in grade three through five. The bar graph shows that for every performance level predicted by

Acuity either in the content area of english language arts or math, the MAP score for the students trended in the following manner.

In order to code the data for the simple linear regression, performance levels were entered as 4, 3, 2, and 1 instead of Advanced, Proficient, Basic, and Below Basic. Therefore, when the data was output, the positive correlation shows the performance level for Acuity's predictive C as increasing in one point, while it is saying the performance level will increase to the next performance level. For instance, a student who Acuity's predictive C's formative assessment had a predictive score of Proficient, the student received a 3. Therefore, the data is saying that for a third grade student in english language arts, the student would score 0.32 away from the proficiency performance level on the actual MAP assessment.

After analyzing data across grade levels there is a stronger predictive power for the Acuity predictive C formative assessment correlation with MAP in the fourth grade level. The data shows that for every point a student received on their Acuity predictive C english language arts formative assessment, they would score 0.24 below the actual performance level on the MAP assessment for english language arts. The same strong correlation was evident for the math correlation with a student having one predicted point higher on their Acuity predictive C's formative assessment and their actual MAP score for math being just 0.18 below the predictive Acuity score on the MAP assessment for math. Many factors come into play when looking at the data from across grade levels. Fourth grade showed a strong positive correlation possibly for a few reasons. Background knowledge on the grade level is that they had used Acuity with fidelity throughout the entire school year. Students were being pulled during their intervention time to work through the Acuity program in areas that were identified by previous predictive assessments. Students continuously were aware of the importance fourth grade teachers were

placing on the program both inside the school day and outside the school day. Acuity has an option of working through the program not only at school but also at home through the internet. Teachers can strategically assign students assignments and tasks through the program that they were recommended for based on the data from their predictive assessments in both the areas of english language arts and math. The program was used consistently with power throughout the entire school year in the fourth grade classrooms. After reviewing data, it is evident that the power behind the implementation played a part into the positive correlation that was predicted out of the correlation scores between the Acuity predictive C formative assessment and the MAP score.

While the fourth grade team held the highest positive correlation in both english language arts and math, there could be other factors that play into the outcome of the data such as number of students, number of students on IEP's, number of students on 504 plans, number of students reading below grade level, etc. All of this information could play apart into why fourth grade had higher predictive power in the english language arts and math's positive correlation between both Acuity predictive C and the MAP 2013 assessment for both english language arts and math.

Conclusions and Recommendations

The null hypothesis stated that there is no predictive power in the formative Acuity predictive assessments towards the state MAP test for students in grade third through fifth in the content areas of math and ELA. The results of this study using this selected data set of students in grades third through fifth in the content areas of math and ELA indicate that there is significant predict power in the Acuity predictive formative assessments. With the alpha level for all simple linear regressions set at 0.1, all p-values were significant lower indicating that the null hypothesis for all six simple linear regressions can be rejected with confidence. There is a significant predict power in Acuity's predictive C formative assessment for both content areas of math and ELA for students in grades third through fifth grade.

The conceptual underpinning is strongly supported that the Acuity predictive C formative assessment has predictive power in determining a student's spring MAP score for both content areas of math and ELA. With the conceptual underpinning being solidified through the data output from the simple linear regressions, the school districts administrations and instructional coaches can continue to improve processes and procedures in and around the Acuity predictive assessments and data analysis. The benefits of students in grades third through fifth using predictive assessments throughout the school year greatly help predict and track student performance on their end of the year state assessment scores on the MAP assessment in the content areas of math and ELA.

After concluding this study there are further studies that could be conducted to further investigate not only the predict power of the Acuity predictive formative assessments, but also the power in using the Acuity program to develop instructional strategies that meet each individual students needs. New state test scores, MAP scores will be released after this spring's

MAP assessment for students in grades third through fifth. A study could be performed to analyze the growth of students in the content areas of math and ELA. Data could be compiled from not only the predictive C Acuity database for the school years of 2012-2013 and 2013-2014 but also MAP data from DESE for the spring 2013 assessment and the spring 2014 assessment. Students could be identified to see if their predicted state test scores, MAP scores, were positively predicted as well as if they showed growth in their data. This data could be laid out to show the growth of student's academically in the areas of math and ELA from the two years of using the Acuity program within the district. Also, a further study could break down data into raw numbers instead of using performance levels of advanced, proficient, basic, and below basic. In a further study using raw data from both the Acuity predictive C formative assessment and the MAP test for the content areas of math and ELA, data would be more specific in the power of the prediction between the Acuity predictive C formative assessment and the MAP test.

Professional development needs to occur across the district in all grades levels to make sure that teachers are aware of the power of the Acuity program. While the Acuity program is forecasting a students' performance on their state assessment, MAP, it also breaks down data by district, building, grade level, and classroom in order for administrators, instructional coaches, and teachers to provide direct instruction at each and every students' level. With strategic planning and instructional strategies, students should be improving in both their forecasting of performance scores from Acuity predictive assessments as well as their final outcomes on the state assessment, MAP. Through continuous professional development, Acuity can become a resource that teachers feel comfortable using for gathering student data as well as using the data to develop lesson plans and implement instructional strategies that strategically focus on individual student needs.

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