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How Does Using a Student Interest Inventory Benefit Teachers and Teacher Candidates?

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How Does Using a Student Interest Inventory Benefit Teachers and Teacher Candidates?

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Abstract

Using a Student Interest Inventory and interest-aligned mathematics problems, this article connects interest alignment with student performance. The findings from this pilot study reveal students' performance increased when interest-based problems were incorporated into their mathematics curriculum. These findings serve to inform teachers wishing to increase student performance and engagement in their classroom. They may also inform teacher candidates completing the Educative Teacher Performance Assessment (edTPA), particularly with Task 1.

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Introduction

The main focus of this paper is to explore the use of a student interest inventory in strengthening task 1 of the secondary mathematics Educative Teacher Performance Assessment (edTPA), an assessment used in higher education in the preparation of teachers. As of 2016, there were 655 educator preparation programs in 36 states and the District of Columbia that required the edTPA for program completion or state teacher certification (edTPA, 2016). “The edTPA requires preservice teachers to provide evidence of planning, teaching, and assessing for conceptual understanding, procedural fluency, and mathematical reasoning” (Wade, Sonnert, Sadler & Hazari, 2017). It also suggests teacher candidates use a Student Interest Inventory to get to know their students, and in turn, use this information for planning.

The motivation behind this study is the author’s personal observation of a tendency of adolescent aged students to express disinterest and difficulty in connecting with mathematics as a topic. Quite often, mathematics students can be heard saying phrases such as ‘I hate math,’ ‘I’m not good at math,’ or the most popular, ‘When am I ever going to use this?’ Such expressions can even be observed among adults through sayings similar to ‘Oh, I was never good at math,’ or ‘Math isn’t my thing.’ Due to this observation, the author became motivated to investigate the reasoning behind such feelings and what can be done to address such negative connotations with mathematics. This teacher candidate became curious about how to change the minds of young students and influence them to see math as their *thing*. Thus, the author decided to investigate the effects of implementing interest-related curriculum into an adolescent mathematics classroom. The goal was to determine whether or not this integration of interest could increase students’ interest, participation, and performance in their mathematics course. Likewise, the goal was to determine if the student interest inventory recommended by the edTPA was a worthwhile task that could address interest and performance in the secondary mathematics classroom.

Definitions

Identity: Gee (2001) labels identity as the type of person one identifies as, or can be identified as by others. "The 'kind of person' one is recognized as 'being,' at a given time and place, can change from moment to moment in the interaction, can change from context to context" (Gee, 2001, p. 99). Each person has multiple identities which may be displayed due to the variety of situations the individual may find themselves in. Cribbs, Hazari, Sonnert, and Sadler (2015), explain that the identity is "an individual's narration of his or herself." (p 1050). This idea is corroborated by Andersson, Valero, and Meaney (2015), "Identities as discursive constructions are unstable and malleable stories" (p. 145). The development of an identity helps an individual to associate themselves with a certain topic or skill (Gee, 2001, p. 99 – 125). "Identity not only refers to the ways in which one participates in rituals and activities unique to one community, but also to the ways in which others view and place value on such membership and participation" (Aydeniz & Hodge, 2011, p. 518). Students' identities are influenced by four main groups and their perceptions of the student: teachers, parents, peers, and themselves (Aydeniz & Hodge, 2011; Cribbs et al., 2015; Williams, 2011; Mata, Montiero, & Peixoto, 2012; Froiland & Davison, 2016; Herald). Other researchers, such as Mata et al. (2012), use the term attitude in the place of identity. For the purposes of this study, attitude and identity will be used interchangeably.

Mathematical Identity: "First, there appears to be a close connection between mathematics identity and academic identity among students" (Martin, 2000, p. 22). As discussed above, each individual has multiple identities within their collective sense-of-self. The academic one relates to a student's view on their life at school. Martin (2000) argues that this academic identity houses the mathematical identity. A mathematical identity encompasses, but is not limited to, a student's feelings, behaviors, and performance in mathematics. Cribbs et al. (2015), define mathematics identity as "how students see themselves in relation to mathematics based on their perceptions and navigation of everyday experiences with mathematics" (p. 1050). A key feature of a student's mathematics identity is their verbal statements about math. These statements provide insight into their mathematical identity. For example, a student who says 'I think math is boring,' is much more likely to have a negative math identity than a student who makes the statement 'I enjoy doing math.' The second student in this example would likely have a positive math identity. Anderson et al. (2015), do caution against making a judgement on a student's mathematical identity based solely on their verbalizations. They explain that such expressions are "related to the possibilities that pedagogical discourses make available to students" (Andersson et al., 2015, p. 145).

Interest: In the case of this study, interest will reference a student's interest in mathematics. Stevens and Olivarez (2005) identify interest as "an aspect of personality, a type of motivation, and a result of the individual characteristics of various tasks" (p. 141). Similarly, Cribbs et al. (2015) define interest as "a student's desire or curiosity to think about and learn mathematics" (p. 1052).

Motivation: "Students with high mathematics motivation, enjoy doing mathematics, stick at problems until they are solved, continue to think about puzzling ideas outside class, and become absorbed in their mathematical activities" (Galbraith & Haines, 1998, p. 278). Motivation involves a student's willingness to be persistent in their work, despite challenges. Galbraith and Haines found that "mathematics engagement is strongly associated with motivation" (p. 285).

Mata et al. (2012) relate motivation to students' involvement in class. They explain that students who are more involved in class activities and related work, display higher motivation (Mata et al., 2012, p. 3; Singh, Granville, & Dika, 2002).

Participation: For the purposes of this study, participation is defined as a student's attempt to respond to a prompt. Participation is not reliant on the correctness of the response. For instance, a student who raises their hand to answer a teacher's question would show participation, regardless of whether or not the student is selected, or if their answer is deemed correct. Likewise, if a student tries to solve a math problem on a quiz, but receives not points for accuracy of the answer, the student has shown participation.

Performance: Performance is based on the accuracy of a student's response. Performance requires participation, but goes one step further, in requiring that the student's response be selected and correct. Performance equates to a student's grade in the traditional sense. Performance generally provides students with a score of the correctness of their answer. Scores can be used to compare performance between students, or compare the performance of the same student over time.

Student Interest Inventory: A Student Interest Inventory is a survey administered to students in order to gather information about their interests. "A Student Interest Inventory . . . contains questions that help teachers relate to the students as an individual" (Cunningham, 2009, p. 144). Shumow and Schmidt (2013) provide a comprehensive list of possible items to include on such an inventory. All of their suggestions are to obtain qualitative data from students.

edTPA: The Educative Teacher Preparation Assessment (edTPA) is a performance-based, subject-specific assessment and support system used by more than 600 teacher preparation programs in some 40 states to emphasize, measure and support the skills and knowledge that all teachers need from Day 1 in the classroom" (AACTE). The edTPA is the assessment completed during student teaching that allows teacher candidates to receive their initial certification as a teacher in New York State. In 2016, 36 states including the District of Columbia require completion of the edTPA to acquire teacher certification. The edTPA is an involved examination which involves planning lessons, video recording teaching practices, and analyzing the candidate's own performance, as well as the performance of students. When considered as a whole, the edTPA develops a portfolio which demonstrates a teacher candidate's pedagogical skills and knowledge (edTPA, 2016; AACTE; Pearson, 2017). "It is transforming the preparation and certification of new teachers by complementing subject-area assessments with a rigorous process that requires teacher candidates to demonstrate that they have the classroom skills necessary to ensure students are learning" (AACTE). This is accomplished through the structure of the edTPA. It is comprised of three segments, known as Tasks: Planning for Instruction and Assessment, Instructing and Engaging Students in Learning, and Assessing Student Learning. Each Task is then further broken down into five Rubrics (AACTE; Pearson, 2017).

Teacher Candidate: Throughout this report, the term 'teacher candidate' will refer to a college student who is participating in their practicum teaching experience. Typically, this takes the form of student teaching. The teacher candidate is assigned to a currently practicing teacher, known as a School Based Teacher Educator (SBTE), in the field of their content specialty. The teacher candidate and SBTE work closely together throughout the student teaching process to plan, teach, and prepare materials for the edTPA. The teacher candidate will prepare their edTPA during their semester of student teaching.

Literature Review

Student Interest Inventories

Student Interest Inventories are popular in determining the particular interests of students. There are a variety of inventories exemplified in literature. Among these are the Factoring Influencing College Success in Mathematics (FICS-Math) survey and the Mathematical Interest Inventory (MII) (Cribbs, 2012; Stevens & Olivarez, 2005). "The Factors Influencing College Success in Mathematics (FICS-Math) study was a national study that sampled single-variable calculus classes at 2- and 4- year colleges and universities across the U.S" (Cribbs, 2012, p. 44). The FICS-Math study was developed by the Science Education Department at the Harvard-Smithsonian Center for Astrophysics under the leadership of Dr. Phil Sadler. The FICS-Math study was supported by the National Science Foundation in 2009. "This type of large-scale study can gather more generalizable data than small-scale studies, and FICS-Math, in particular, is the first nationwide study of this type to look at factors influencing college calculus performance" (Cribbs, 2012, p. 45). Among other things, the FICS-Math survey gathered information about students' interests and performances in mathematics courses. The FICS-Math data has been used in numerous projects related to mathematical performance (Cribbs, 2012).

The MII was developed by Stevens and Olivarez (2005) to assess student interest as broken down into two categories: situational and individual. Stevens and Olivarez (2005) state that "most researchers currently agree that two types of interest exist, situational and individual" (p. 141). Situational interest involves "instant enjoyment", "from an attention-holding, often novel situation or event that offers an ideal level of challenge" (Stevens & Olivarez, 2005, p. 141). In contrast, individual interest is "associated with an increase in one's knowledge, value, and positive emotion in a specific domain" (Stevens & Olivarez, 2005, p. 142).

SIIs have also been used in smaller scale studies. Mitchell (1993) provides an exemplar Student Interest Inventory based on a Likert scale format (p. 436). Similar to Stevens and Olivarez's (2005) study, Mitchell's (1993) "interest inventory is a measure of adolescent interest in the mathematics classroom designed to measure two general areas of interest," which are then identified as 'personal' and 'situational' interest (p. 428). Notice that both studies identify two varieties of interest. In order to merge these two schools of thought together, situational interest remains constant, while the personal interest is equated with individual interest, as they both pertain to students' individual and changing curiosities and concentrations (Steven & Olivarez, 2005; Mitchell, 1993). Mitchell's (1993) "interest inventory followed a self-report survey format" (p. 429). This is a commonality among all of the student interest inventories considered for the basis of this study. The students reported their own opinions while interviews or other sorts of data collection were not used. Aligning with the FICS-Math, Stevens and Olivarez's, and Mitchell's studies, the SII used a Likert scale where students responded to questions on a scale ranging from 'strongly agree' to 'strongly disagree' (Cribbs, 2012; Stevens & Olivarez, 2005; Mitchell, 1993). In the case of the SII used in this pilot study, the specific domain was in mathematics.

"One way to engage students is by getting to know them personally" explains Cunningham (2009, p. 144). Cunningham (2009) uses this as justification for engagement practices such as the implementation of a student interest inventory. Cunningham's (2009) example student interest inventory is not domain specific and asks solely qualitative questions. Unlike the other inventories, this one does not use a rating system for students to agree or disagree with provided statements. This one is open ended and relies on the students to provide their own responses (Cunningham, 2009, p. 199-200).

The edTPA

The edTPA is a performance-based, subject-specific assessment and support system used by more than 600 teacher preparation programs in some 40 states to emphasize, measure and support the skills and knowledge that all teachers need in the classroom" (AACTE). Used as an assessment to determine the qualifications of teacher candidates pursuing their initial teacher certifications, the edTPA is a lengthy assignment which spans the duration of student teaching. It is highly intensive, particularly with the expectations for writing. Most teacher candidates, who have never taught full time before, struggle to write about their pedagogy at the level expected from the edTPA.

There are three parts of the edTPA: Task 1 is Planning; Task 2 is Instruction, including videotape analysis of one's own teaching; and Task 3 is Assessment of student learning. Task 1 includes a document known as the Context for Learning. The Context for Learning is comprised of responses to a series of prompts, in which the teacher candidate explains the district, school, room, and class in which they are working. The candidate is asked to describe particular features of the class which will influence planning. "List any special features of your school or classroom setting (e.g., charter, co-teaching, themed magnet, remedial course, honors course) that will affect your teaching in this learning segment" (Pearson, 2017). In another prompt, the candidate is asked to "Describe any district, school, or cooperating teacher requirements or expectations that might affect your planning or delivery of instruction, such as required curricula, pacing plan, use of specific instructional strategies, or standardized tests" (Pearson, 2017).

Student Interest Inventories (SIIs) are not required to be included in the Context for Learning, however, the prompts above require information about the planned instructional strategies and features of the classroom that influence teaching. If interest-based problems are being incorporated in order to improve student performance, as this study aims to show, then that information must be included in the Context for Learning. The interest information would be gathered from a Student Interest Inventory. Doing so can make teacher candidates feel more comfortable and knowledgeable in their writing, due to the fact that their writing is synthesizing information that they can actually see and interact with.

Methods

In this section, the author describes the design of the study. This includes an explanation of the Student Interest Inventory, its use for data collection, and the connection between the SII and interest-related problems. The sample, administration procedures, and formatting are also discussed.

Research Design

Students in an Algebra 2 classroom were given the SII. The inventory was designed to gather data about their interests and hobbies, as well as contributing factors to their identity development. The purpose of the SII was to gather data in order to inform planning, by aligning problems with students' particular interests. These problems could be implemented in instruction, independent practice, as well as summative or formative assessments. The results have been found by comparing students' performance on the interest-aligned problems with their performance on problems which were not intentionally aligned to their interests.

There were two data collections. The first was the collection of the SII to gather information on interest and identity. Students completed the inventory individually and were given their own SII with directions for completion. The directions were also read aloud to the class and an opportunity for questions was presented before students began. All students were finished within 10 minutes. The SII responses were collected and evaluated in order to create problems based on the students' most common responses.

The second data collection was of student work samples to show their performance on the problems aligned with their interest. The students' performance on these interest-aligned problems was then compared to their performance on previous assessments which did not have problems intentionally aligned with students' interests.

Student Interest Inventory (SII)

The SII used in this study was created by the author and is based on inventories implemented in other studies, such as those referenced in the Definitions and Literature Review. It can be found in Appendix B. This SII incorporates the qualitative and quantitative items common to other inventories. Namely, almost all other inventories asked students questions which they responded to using a Likert scale; therefore, this SII also incorporated scaled responses. This sort of response is also very practical for statistical analysis.

The SII had two components: mathematical interest and mathematical identity. The first part, mathematical interest, was made up of five questions to determine students' interests outside of the mathematics classroom. The questions asked students about their lives outside of school, and their classes outside of mathematics. These items were left open-ended for students to provide their own responses rather than choosing from a predetermined set. A frequency table was created to present the common responses. The most common responses were used in crafting interest-related problems, in order to connect with the most students when those problems were implemented on assignments. Responses from a single student, or from a small number comparatively, were not used to create interest-related problems.

The second part of the SII involved 10 statements, connected to mathematical identity elements, where students ranked their level of agreement on a one to five level Likert Scale that ranged from Strongly Agree to Strongly Disagree with Agree, Neutral, and Disagree as the range of options in between. During analysis, these responses were transposed into numerical values with Strongly Agree being five and Strongly Disagree being a level one. Items 10 and 13 were reverse coded such that Strongly Agree became a one while Strongly Disagree became a five. This was done to maintain consistency. These items were phrased from a negative view, while all of the other statements were phrased in a positive manner.

The 10 identity development statements were designed to show whether or not students perceived mathematics as a worthwhile pursuit. For example, one statement read, ‘I think that math will help me later in life.’ Such questions were designed to expose students’ views on the purpose of their mathematics education. If students tend to see their pursuits as worthwhile and useful later in life, their identities in that subject are more inclined to be strong (Cribbs et al., 2015).

Some elements of the identity were covered by more than one statement, such as, ‘Learning new things in math is fun for me,’ has a similar purpose as ‘I enjoy my time in math class.’ These statements relate to the identity forming quality of gaining enjoyment from an activity. The similarity between these two statements is an intentional one. Analyzing and synthesizing the results from both statements gave a clearer picture of students’ experiences towards mathematics as a subject. From there, students’ identities can be more accurately inferred from the data (Cribbs et al., 2015).

Sample and Survey

Only one class was used in the study, thus the number of participants is small. For this reason, it is referred to as a pilot study. There were 22 participants in the student interest inventory. Among these 22, there were 12 female students and 10 males. All students were in Algebra 2 for the first time. The age range of students was between 15 and 17 years old. The students were members of a Common Core Algebra 2 class at an upstate New York (NY) high school. The author, in the role of a teacher candidate, took part in an educational field experience placement in the Spring 2017 semester. All students in the class took part in the study because of the relevance to their curriculum. The survey was administered by the author, and students completed the survey within ten minutes. They then completed an exit ticket related to the day's lesson. The surveys were collected by the author for analysis.

Common Responses

Once the survey was given, the responses from Part 1 were analyzed to find common responses. The most common responses were then used to create problems which aligned to students' interests. Item 1 on the SII was about students' activities at home. There were two students who made no responses, two responses with no useful data – the responses were "I'm not at home," and "I don't have any," – leaving 18 responses that informed planning. The most common activities were socializing friends and family; enjoying music, movies or television; and sports.

Item 2 asked students about their favorite classes. All students responded to this item. Some responded with one class while others listed multiple classes. All responses were considered. The most common were in the science field, particularly with a medical tendency, English, and history.

Item 3 related to students' hobbies. Only one student did not respond to this item. There were 21 respondents, with some giving multiple hobbies. Among these responses, the most common were related to sports and physical fitness. Other popular answers were socializing and reading or writing.

Item 4 asked students about their favorite games and sports. 17 responses were given. Two students did not respond at all, while three of them gave responses that gave no useful information. These responses were "2k," "none," and "I don't play sports." The most common groups of responses were running, which included track and cross country, lacrosse, soccer, and basketball.

Item 5 was about students' favorite television shows and movies. There were 19 responses to this item. Two students did not answer, and one did not provide a useful response of "Yeah." It was difficult to find common responses from this item. Categorizing the responses was the best option to gather useful information. Ten responses involved action and adventure shows and movies, with a focus on crime drama as well as superheroes. Due to its difficulty to generalize, this topic was not involved in any of the interest-related problems.

Development of Problems

Based on the most common responses above, the investigator developed mathematics problems aligned with these interests. The subject of the problems was determined based on the progress of the Algebra 2 class. The content at the time of administration was probability, so the problems were designed to align with the probability curriculum of Common Core Algebra 2. In particular, students were learning about two-way frequency tables. The problems designed by the investigator are included in Appendix C.

Research Questions

The research questions targeted the value of using a SII in a classroom and connected to the goal of determining if they could support teachers and teacher candidates in learning more about their students. Additionally, this study was designed to determine if using such inventories can be connected to student performance. The questions aligned with the edTPA Context for Learning's suggestion of using a SII during teacher candidates' student teaching experience.

The research questions are:

1. Does using a student interest inventory connect students with the material to be taught?
    a. Does using a student interest inventory result in better performance on an assessment?
2. Is using a student interest inventory a worthwhile activity in the classroom?
3. How can using this information help to inform Task 1 of the edTPA?

Findings

The problems designed to align with students' interest were incorporated into assignments given in the Algebra 2 classroom. This allowed the interest-related problems to be compared to problems that did not incorporate student interest. For example, a quiz contained a problem involving a frequency table displaying information about children's and adults' travel patterns. This problem was compared to one with a frequency table about high school students' favorite classes. The travel problem did not relate to interest, whereas the high school problem did relate to interest and their current lives.

In all, there were a total of eight items used for analysis. Two of these problems were interest-related problems created by the investigator. The other six problems were not related to student interest and were created by either the New York State Common Core Curriculum for Algebra 2 or by the classroom teacher.

Each problem was assessed in the same manner. First, each problem was assigned a certain number of potential points. The number of points possible was based on the steps required to solve the problem correctly. Each problem was then assessed for correctness, and assigned a value out of the possible points. As an illustration, for a problem with a possibility of four points, students could receive either zero, one, two, three, or four points, dependent on the quality of their work. The potential point value varied from problem to problem. The mean performance of the non-interest problems was calculated as well as the mean performance of the interest problems. This provided two independent groups, interest versus no-interest, for 18 of the 22 students who were present for all of the required activities for this study.

Student Performance Analysis

Table 1 shows the mean performance for the interest aligned problems to be higher than the mean performance for the no-interest problems. Out of 100 points, Table 1 shows, on average, students performed higher on the interest-related problems. It is also important to note the level that each score represents. Typically, the score at which students are considered to have mastery of the content is set at 85%. Using this benchmark, this data shows that on average, students scored in the mastery level when their problems were aligned with their interest, but they scored below mastery when the problems were not aligned to interest. The standard deviation for the interest problems also shows there is less spread in performance data for this group. A lower value of spread means that the interest related scores were clustered more closely, that is, there was less variability in the students' responses to interest-related problems. Comparatively, the higher standard deviation value for non-interest related problems shows more variability in students' responses to these problems and less consistent results. Applying this to students' learning, this means that students' responses to problems that incorporated their interest were closer to the correct response than their responses to problems which did not incorporate their interest.

Table 1

Paired Sample Statistics

	Mean	*n*	Standard Deviation
Interest	87.3832	18	9.43281
No Interest	77.1809	18	14.31571

Table 2 displays the Paired Sample T Test and reveals a statistically significant difference, when compared to random chance, in student performance across the interest versus no-interest-related problems. The *t*-value was used to determine significant difference and measured the difference between the means of the groups with standard deviations as units. The *t*-value indicates a significant difference in students' mean performance on the interest-related problem when compared to the set of no-interest alignment problems. In this case, the *t*-value is positive, indicating that the mean interest performance was greater than the mean no-interest performance (Runkel, 2016).

The mean value also shows the students scored about ten points higher on problems related to their interest than those that were not aligned. It should be noted that an increase by ten points is not automatically guaranteed by incorporating interest, however, this range of improvement is possible. This potential variability is shown by such a large standard deviation value.

Table 2

Paired Sample T Test

	Mean	Standard Deviation	*t*	sig(2-tailed)
Interest-NoInterest	10.20226	17.84645	2.492	.023

Figure 1 shows the mean performance on interest aligned problems and no-interest aligned on a graph is scaled to 100, representative of the maximum score that could be earned. The mean performance is represented by the height of blue bars, and the error bars represent the standard error if the mean for each group. The error bars reveal the upper and lower limits for each estimate (Queensland, 2015).

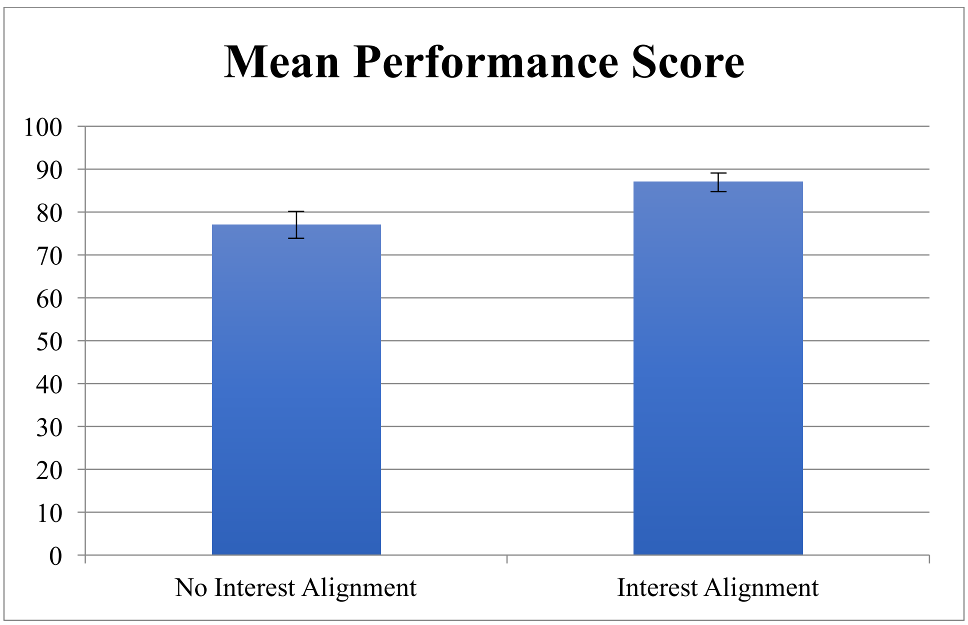

Figure 1: Mean Performance Score with Error Bars – A comparison of the average performance on items aligned with students' interests versus those not aligned with their interests.

Queensland (2015) stated:

> *error bars allow the reader to easily determine whether there is a statistically significant difference between any estimates shown in the graph. If the error bars for any response categories do not overlap, then there is usually a statistically significant difference in the estimates for those response categories. If the error bars do overlap, then there is no statistically significant difference in the results.* (p. 4)

Notice that the range of the error bars in Figure 1 do not overlap. It can be seen that the No Interest Alignment error bar ends at a score of approximately 80, while the Interest Alignment error bar does not begin until approximately 83. Thus, the error bars do not overlap. This shows a statistically significant difference between performance on interest-related problems and problems not related to students' interests.

Discussion

The purpose of this section is to make connections between the statistical findings of this report and the background knowledge that is available on the topic. The author will point to conclusions that may be drawn from the data, and best practices to employ in the classroom as well as on the edTPA.

Conclusions

The data showed that there was a statistically significant difference in students' performance on problems which incorporated their interests, as compared to problems that were not crafted to incorporate interest. This means that introducing interest-related problems on students' assignments increased their mathematical performance. From this increase in performance, it can be concluded that students were better connected to the mathematical content through interest-related problems.

These problems were created reliant on the responses to a Student Interest Inventory, so it has been shown that using a SII is a valuable use of time in a classroom. This is true for both current teachers and teacher candidates working on their edTPA. Using a SII is a worthwhile activity because it takes minimal time away from instruction, while greatly increasing students' performance on assignments as shown by the data in this pilot study.

Suggestions

For current teachers. The data showed that incorporating interest related problems can improve students' performance. Therefore, it would be beneficial for teachers to incorporate such problems, and to do so, a Student Interest Inventory provides one way of knowing how to connect mathematics problems to students' interest. Interests should not be assumed. The SII used in this study found topics of interest related to favorite classes, sports, and hobbies. These topics should be adapted as needed for each class and grade level.

The benefits of incorporating interest into the curriculum can be extended to mathematics classes for younger students, however, their interests may be different than the eleventh-grade students considered in this study. Better topics for younger students can be determined by using a SII appropriate for students at that level. Likewise, it may be beneficial to consider students' occupational aspirations and goals for senior level students. This indicates the SII can be modified on a yearly or semester-to-semester basis. Each new SII will likely give new results about students' interests, since each group of students is unique. Therefore, problems created for last year's class will not be accurately based on the interests of the new class. Recycling problems is not suggested, unless the interests are determined to be the same. Again, this should be determined by collecting data through an inventory as opposed to assuming or generalizing.

It is also important to be cognizant of topics that students may feel uncomfortable discussing. These should not be included on an inventory which includes students' names. If the SII is given anonymously, it may be appropriate to ask more personal questions. Students may be more likely to respond honestly, due to the added layer of protection of anonymity. An anonymous SII would be best for garnering sensitive information from students. Unless the interest-related problems are intended to be used for differentiated instruction, there is no needed for students to list their name on the interest inventory. The information will be used for all students, so identifying individuals may make some students uncomfortable unnecessarily. This decision can be made on a case-to-case basis, depending on the students and the items included on the SII. For example, many districts are currently experiencing challenges educating students from economically disadvantaged backgrounds. It is beneficial for teachers to know about a student's home life, however, it would be inappropriate to ask students about financial matters if their information can be identified. If information of a sensitive nature is required, there may be other ways to gather it, such as consulting a student's records or the school psychologist.

Many benefits of incorporating interest have been discussed. There are some considerations to be made though. This article is not suggesting that all problems used in the classroom, or on assessments, should involve students' interests. Doing so may actually be detrimental to students' academic success. Consider the standardized state assessments that a vast majority of students take. These are summative assessments which are often used as final grades, particularly at the high school level. The problems on these assessments are not created to relate to students' interests. Due to the importance of these assessments, students need to be able to solve any sort of problem successfully, not just those that they relate to.

Aside from improving students' scores on assessments, using a SII in your classroom helps to build relationships with students. The goal of the survey is to find out about your students: their lives outside of school, their interests, and how they enjoy spending their time. This is valuable information to a teacher, even if it is not used to improve students' performance. According to Nelson (2014), SIIs can encourage responsibility and cooperation. In turn, this may increase students' academic performance, even if this was not the main target.

For teacher candidates. This section is intended to suggest best practices for teacher candidates who are completing the edTPA. This section is specifically related to the edTPA. Please note that some information from the above section for current teachers will also be helpful to teacher candidates as they develop their own pedagogical techniques.

Task 1 of the edTPA focuses on a teacher candidate's ability to plan instruction that supports their students' needs. Among the requirements in this section are two documents known as the Context for Learning and the Planning Commentary. The Context for Learning is used to describe the setting, demographics, and any specific special features of the classroom in which the teacher candidate is teaching. The Planning Commentary asks teacher candidates to write about the lesson planning process. They are required to describe their thoughts while designing each lesson. One particular section of the Planning Commentary is 'Knowledge of Students to Inform Teaching.' This section asks teacher candidates to describe what they know about the students they work with, with respect to the unit plan they have designed. The Planning Commentary also includes a section in which teacher candidates describe how they are supporting students' mathematical learning. The Planning Commentary asks teacher candidates to describe specific learning needs of individual students or the whole class, as well (Pearson, 2017).

Both the Context for Learning and Planning Commentary can be vastly improved with general knowledge of students' interests and instructional needs. For this reason, implementing a Student Interest Inventory is recommended for teacher candidates. First, the Context for Learning will be discussed.

Demographic information can also be asked on the SII. This can be as basic, or detailed as the teacher candidate would like. Generally, the demographic items which are included relate to gender and age. The Context for Learning also requires teacher candidates to describe any special features of the classroom. With the information from the SII, teacher candidates have a wide variety of features to discuss. Students' popular interests, preferred learning styles, planned future careers, or opinions on mathematics would all be appropriate to discuss in this section (Pearson, 2017).

The Planning Commentary is a larger component of the edTPA than the Context for Learning. The Context for Learning has a four-page limit while the Planning Commentary has a nine-page limit. Using the data collected on the SII allows for a well-crafted Planning Commentary in addition to the Context for Learning. The SII would be most beneficial to the segment related to knowledge of the students. Gaining knowledge of the students was the main goal of such an inventory. There are three subsections to the 'Knowledge of Students' section. In each, teacher candidates are given the following direction: "For each of the prompts below (2a–c), describe what you know about *your* students *with respect to the central focus* of the learning segment" (Pearson, 2017).

Part A prompts teacher candidates to describe: "Prior academic learning and prerequisite skills related to the central focus—*Cite evidence of what students know, what they can do, and what they are still learning to do*" (Pearson, 2017). Notice that the requirements ask for citation of evidence. This evidence comes directly from the SII. Outside information will also be necessary, but the students' opinions on their current performance in their math class will help to inform this section. This corresponds to item 10 on the SII (Pearson, 2017).

Part B prompts "Personal, cultural, and community assets related to the central focus—*What do you know about your students' everyday experiences, cultural and language backgrounds and practices, and interests?"* (Pearson, 2017). This prompt holds clear connections to the Student Interest Inventory. The intention of the SII was to learn about students' everyday experiences and interests, therefore this section will be much easier to write about with data from a Student Interest Inventory. The SII should be discussed during this segment (Pearson, 2017).

Part C asks candidates to discuss "Mathematical dispositions—What do you know about the extent to which your students: perceive mathematics as 'sensible, useful, and worthwhile'; persist in applying mathematics to solve problems; believe in their own ability to learn mathematics" (Pearson, 2017). As with Part B, there are clear connections to the SII. Part two of the SII asked students questions directly related to these topics. Teacher candidates can collect the data from the inventory and record common responses. The Likert scale can be used to determine a general sense of the class's opinion on mathematics. The use of the SII can be used as evidence of the teacher candidate's knowledge of students in this section (Pearson, 2017).

The third segment of the Planning Commentary asks candidates to describe how they knew what mathematical supports the students would benefit the most from. The best way to find out what will work best for students is to ask them. Incorporate an item about what sort of help students prefer on the SII. Describe how the SII informs planning by allowing students to express the help they wish to receive. This section also asks about the specific learning needs of individual students, groups, or even the whole class.

Another item on the inventory should ask students about what they need to learn effectively. This may be the same item that discusses the sort of help students desire, or question such as ‘What do you need from a teacher in order to do your work the best?’ could be included in part one of the SII. This would allow the students to fill in their own responses rather than rate their agreement with a statement like ‘I like to see a picture/diagram when I learn math.’ This can be crafted and formatted by the teacher candidate as needed. This is true for any item you may add to the SII. Consider, which option will provide more useful data for you.

The benefit of asking students these questions directly is the elimination of errors from the candidate’s interpretations and assumptions. The teacher candidate can be confident in the supports they provide to students because the students have asked for them. This assures the teacher candidate of their planning being beneficial and appropriate for students. It is likely this will also increase the implementation and delivery of instruction (Pearson, 2017).

The use of a Student Interest Inventory is being suggested to improve a teacher candidate’s edTPA, mainly in Task 1, but there are other benefits to the teacher candidate and students as well. The benefits addressed here are specific to teacher candidates. There is overlap with the benefits to currently practicing teachers, but to maintain conciseness these will not be reiterated in this section. The remaining suggestions are explicitly for teacher candidates, rather than practicing teachers.

The SII should be administered within the first two weeks of student teaching. This ensures adequate time to use the data on the edTPA and it allows the teacher candidate to have the most amount of time to get to know students. It may be beneficial to incorporate it with introductions. Explain to the students who you are and what you will be doing in the classroom for the next few months. Tell them you would like to get to know them better, so you have a survey for them to fill out. Depending on the age of the students and your own comfort level, it may also be nice to give the students a few minutes to ask questions to get to know more about you.

Student teaching can be a difficult time to get to know students. The teacher candidate is typically introduced in the middle of the year. Student teaching is usually done in the teacher candidate's final semester of college. Following a traditional track, this begins in late January and concludes in May. This is good timing for the teacher candidate, but school-age students may find this timing peculiar. They have already built a relationship with their teacher and developed specific routines. It may take time for students to warm up to you and accept you as another one of their teachers. Developing relationships with students will speed this process.

Similar to the discussion about relationship building in the current teacher section, using a SII at the beginning of student teaching will expedite the process of getting to know the students. Please refer to the above section to read more about the positive effects of building relationships with students.

Limitations

This study was conducted on a very small scale. There were only 22 participants with only 18 offering usable data. Therefore, the results are not necessarily generalizable. A larger study would need to be conducted in order to do so. There are also a minimal number of problems comparing students' performance between interest-related problems and non-interest-related problems. A larger data set would allow for generalizable results.

Further Research

This study was done specifically in the mathematics field. It can be presumed that the results are generalizable to other content areas, however, other studies could confirm this result. The data here was considered on a very small scale. A larger study would provide valuable data by corroborating this information, or providing a more detailed picture of using student interest in the classroom.

Further research could also be done on different aspects of using interest in the classroom. For example, this study focused solely on the incorporation of interest related items on assessments, both summative and formative. Another study could investigate the effect of interest related problems incorporated into examples done as a class. It is predicted that the results will be similar for such a study.

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Appendix A

The College at
BROCKPORT
STATE UNIVERSITY OF NEW YORK

Institutional Review Board
EXEMPT DETERMINATION

Date: 4/24/2017

To: Laura Redinger

From: Julie Wilkens
IRB Compliance Officer
jwilkens@brockport.edu

Re: IRB Proposal # 2016-128

Project Title: Does using a student interest inventory strengthen Task 1 of the edTPA?

Your project has been approved under the following federal exemption:
1. Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Approval Date: 4/21/2017
Expiration Date: 4/21/2018

IRB approval is good for one year. Before the expiration date, submit a Continuation Request on Form K to the IRB office. It is the researcher's responsibility to make sure the protocol approval does not expire.

Under Brockport IRB guidelines, a maximum of **two consecutive continuations** can be granted. After three years, the project must be resubmitted to the IRB as a new protocol for review and approval.

You may use only the documents and procedures that have been approved by the IRB in conducting your research. **If you wish to make any changes to these documents or procedures, you must submit a new proposal and obtain approval from the IRB prior to implementing any changes.** The exception to this is including adding research assistants or new investigators, which may be requested using Form K. You may use the original proposal as a template for the new proposal.

Any injury to a subject due to the procedures must be reported immediately.

When signed consent documents are required, the primary investigator must retain the signed consent documents for a minimum of three years past completion of the research activity.

Best wishes in conducting your research.

Appendix B

Mathematics Student Interest Inventory

Please answer the following questions. You do not have to answer all of the questions, but please complete all of them that you feel comfortable answering. Feel free to ask if you have any questions.

1. At home, my favorite activities are:

2. At school, my favorite classes are:

3. Some of my favorite hobbies are:

4. My favorite games/sports to play are:

5. I like to watch these movies or TV shows:

Answer the following questions by circling the response that is most correct. If you have any questions, please ask for help.

SA = Strongly Agree A = Agree N = Neutral D = Disagree SD = Strongly Disagree

6. I like learning math.	SA	A	N	D	SD
7. I think that math will help me later in life.	SA	A	N	D	SD
8. Learning new things in math is fun for me.	SA	A	N	D	SD
9. I see how math connects to my life outside of school.	SA	A	N	D	SD
10. I am struggling in my math class.	SA	A	N	D	SD
11. Math is something you just memorize.	SA	A	N	D	SD
12. I solve real-world problems in my math class.	SA	A	N	D	SD
13. High school mathematics has little to do with the real world.	SA	A	N	D	SD
14. I am confident in my math skills.	SA	A	N	D	SD
15. I enjoy my time in math class.	SA	A	N	D	SD

Appendix C
Problems Related to Interest

1. Given the two-way frequency table below:

	Prefer Basketball	Prefer Lacrosse	Totals
Female Students	32	25	57
Male Students	41	22	63
Totals	73	47	120

Determine if preferring lacrosse and being a female student are independent events. Justify your answer.

2. In a large high school, 34% of students say science is their favorite subject, 26% of the students are juniors, and 12% are juniors whose favorite subject is science. Given this information, complete the hypothetical 1000 two-way frequency table.

	Science is their favorite subject	Science is not their favorite subject	Total
Juniors			
Not Juniors			
Totals			

a. If a randomly selected student is a junior, what is the probability that science is not their favorite subject?

b. What is the probability that a randomly selected student is not a junior and science is not their favorite subject?

c. In this school, do juniors and non-juniors have similar patterns about science as their favorite subject?

Appendix D
Problems Not Directly Related to Interest

1. Given the two-way frequency table below

	Eat Breakfast	Skip Breakfast	Totals
Students: ages 10-13	40	14	54
Students: ages 14-17	12	24	36
Total	52	38	90

   Determine if skipping breakfast and being a student between the ages of 14-17 are independent events. Justify your answer.

2. In a large community, 72% of people are adults, 78% of the people have traveled outside the state, and 11% are adults who have not traveled outside the state. Given this information complete the hypothetical 1000 two-way frequency table.

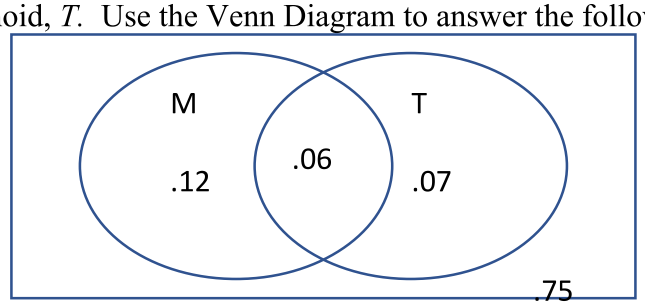
	Traveled outside the state	Have not traveled outside the state	Total
Adults			
Youth			
Total			

   a. If a randomly selected person is an adult, what is the probability that they have traveled outside of the state?
   b. What is the probability that a randomly selected person is a youth and has traveled out of the state?
   c. In this community, do adults and youth have similar travel patterns?

3. A number cube has faces numbered 1 through 6, and a coin has two sides, heads and tails. The number cube will be rolled once, and the coin will be flipped once. Create a sample space of all possible outcomes.
   a. Determine the probability when the number cube shows a 6 and the coin shows heads.
   b. Determine the probability that a 6 is rolled or a tail is flipped.

4. Students are picking marbles from a jar. They find that the chance of picking a red marble is 45% and the chance of picking a green marble is 75%. This student also found that the chance of picking a red or green marble is 85%. Determine if picking a red marble and a green marble are independent. Show the formula and your work.

5. The following Venn Diagram represents a traveler's chances of catching malaria, *M,* or typhoid, *T.* Use the Venn Diagram to answer the following questions.



   a. What is the probability of catching malaria if you have caught typhoid?
   b. What is the probability of catching typhoid given that you have not caught malaria?

Appendix E

LAURA
REDINGER

Address:
8045 Creamery Road
Bergen, NY 14416

Email:
lredi1@.brockport.edu

Cell Phone:
(585) 356-1557

Personal Profile:
A determine soon-to-be graduate pursuing a career as an adolescent mathematics teacher.

Education:
Bachelor of Science in Mathematics, May 2018
Adolescence Inclusive Mathematics Generalist Education Program
The College at Brockport, State University of New York, Brockport, NY
GPA 3.44/4.0

Anticipated Teacher Certification:
Initial New York State Certification Adolescence Mathematics Education, Grades 7-12 with Middle Childhood Extension to Grades 5,6 Students with Disabilities, Grades 7-12

Interests:
Running
Reading

Field Experience

Teacher Candidate, Albion CSD, Charles D'Amico High School, Albion, NY, Fall 2017

- Experience with students with disabilities
- Interaction with IEPs
- Experience with life skills placement

Teacher Candidate, Greece CSD, Greece Arcadia High School, Rochester, NY, Spring 2017

- Provided additional support to students in need of credit recovery
- Redirected and focused students' attention
- Standards based grading experience

Teacher Candidate, Greece CSD, Greece Arcadia Middle School, Rochester, NY, Fall 2016

- Provided instructional support to English Language Learner
- Individual work with students who required additional instruction
- Gained standards based grading experience

Employment

Substitute Teacher, Brockport Central School District, Brockport, NY, September 2017

- Fill in for teachers in a variety of subjects as needed

Summer Teaching Fellow, Uncommon Schools, Rochester Prep Middle School, West Campus, Rochester, NY, Summer 2017

- Worked with mentor teacher to teach three-week summer school program independently
- Practiced *Teach Like a Champion* strategies in- and outside of classroom

Paraprofessional, Monroe BOCES #1, Rush-Henrietta CSD, Good Shepard School, Henrietta, NY, Summer 2016

- Worked individually with adolescent student in life skills, extended school year program
- Viewed IEP's of students to understand how best to provide support
- Supported students with disabilities

Relevant Coursework: