INTRINSIC MOTIVATION ON MATHEMATIC ACHIEVMENT FOR STRUGGLING STUDENTS

CAMERON BUTLER
SPRING 2104

A thesis
submitted in partial fulfillment
of requirements
for a baccalaureate degree
in Special Education
with honors in Special Education

Reviewed and approved by
Paul Riccommini
Associate Special Education
Thesis Supervisor

David Lee
Associate Professor
Special Education
Honors Advisor

*Signatures are on file in the Schreyer Honors College
Abstract

This study is a look at the effect of intrinsic motivation on achievement in mathematics for struggling students. Though the effect of intrinsic motivation on achievement is well established for standard achieving students, this study will attempt to re-evaluate this information through the lens of a shifted focus group, namely students who struggle in mathematics. By employing a curricular-based measure in mathematics and an intrinsic motivation indicator this study attempts to link achievement to differing factors that effect intrinsic motivation. Though all results are tentative, the study has found potentially interesting results related to the shifted importance of self-competence and relatedness for struggling students and how intrinsic motivation effects achievement. This study calls for more research on the subject and is the beginning of the conversation as to how intrinsic motivation may effect achievement differently for students who struggle in mathematics versus the traditional focus groups of standard achieving students.
# Table of Contents

Chapter 1: Introduce and Ration ................................................................. 1
Chapter 2: Relevant Research ............................................................ 4
  Motivation Continuum: From Amotivation to Intrinsic Motivation ........... 4
  Motivation Theories and a Comprehensive Picture ............................. 5
Chapter 3: How Motivation Affects Struggling Mathematics Students and Related Questions ................................................................. 12
Chapter 4: Methods ........................................................................... 14
  Participants .................................................................................. 14
  Materials ..................................................................................... 14
  Procedures .................................................................................. 15
  Confidentiality ........................................................................... 16
Chapter 5: Data ............................................................................... 17
  Data Recording ........................................................................... 17
Chapter 6: Analysis (Trend) .............................................................. 20
  Analysis (Discussion of Trends) .................................................... 20
  Overall IMI Score and Correlation to CBM Score ............................... 20
  Perceived Competence Predicts Achievement .................................... 22
  Relatedness Inversely related to Achievement ................................... 22
  Rough Predictors and Non-Predictors ............................................ 23
Chapter 7: Shortcomings of the Study ............................................. 25
Chapter 8: Discussion .................................................................... 28
Chapter 9: Moving Forward ............................................................... 29
Work Cited .................................................................................... 30
List of Tables

Tables..................................................................................................................... iii
  Table 1 (Data)...................................................................................................... 25
  Table 2 (Data Averages)...................................................................................... 26
List of Figures

Figures................................................................................................................. apx
  Figure 1 (Intrinsic Motivation Indicator).......................................................... apx 1
  Figure 2 (Curricular Based Measure)............................................................... apx 2
Acknowledgements

This thesis would not have been possible without the help of a number of people who I owe a large debt of gratitude. First, I would like to thank the three teachers who were willing to allow me to work in their classrooms as well as the Assistant Director of Special Education. For confidentiality purposes I will not divulge their names, however, they were all extremely helpful and understanding of my relative inexperience with conducting research. I certainly could not have finished the work without them. Additionally, I would like to thank Dr. Paul Riccomini, Dr. David Lee, Dr. Kate McKinnon, and Dr. Linda Mason who all, at some point, offered guidance with various academic and logistic steps in the process. Completing a study like this was one of the more complex and difficult feats of my life and I cannot overstate the incredible aid each of these people offered in my pursuit of a completed thesis.

I would also like to acknowledge both my parents and my roommate for putting up with my complaining during the study: they definitely deserve some of the success of this thesis.
Chapter 1  
Introduction and Rational

During a field experience completed in a learning support mathematics classroom, a teacher was reviewing the five times tables using a system that was unfamiliar. By using a series of arrows, the teacher attempted to explain the reciprocal relationship with the equation and the answer. The unit was clearly focusing on the idea that multiplication and division are two parts of the same whole number sequence (i.e., 5*5=25 and 25/5=5 are the same number sequence). Needless to say, it was a difficult concept. The students didn’t look like struggling learners, they looked almost indifferent to the entire lesson. The students sat staring at the front board, most looking completely unaware of the mathematic lesson going on around them. The students were completely unmotivated and uninvolved in the entire mathematics lesson.

It is not difficult to see that for many students mathematics isn’t the most interesting subject in school. Though there have been recent shifts in other academic areas (reading, writing, social studies, science) toward more student centered project based classrooms, mathematics has retained many characteristics of an educational era dead and gone. The assumption is that mathematic concepts do not translate well to the more exploration-oriented shift of new education methodology. What this means is that mathematics continues to hold a very teacher lead, rote memorization oriented pedagogy. Mathematics is in a very real sense for children the most boring subject of the day (Maccini, Strictland, Gagnon, & Malmgren 2006).

This tradition of mathematics education with it’s a more teacher-oriented classroom is compounded for struggling and LD students. For these students the emphasis is placed on direct
instruction (DI) techniques. The basis of DI is that with enough explicit explanation, repetition of answering (opportunities to respond), and close scaffolding for errors, a student should be able to quickly learn at a high level of success. Though DI techniques work extremely well for struggling students (as well as standard achieving students), it seemed to be a direct factor in the apathy of those students in the classroom. Seeing children so indifferent to the learning begs the have question, how much is that child is even paying attention (Mastropieri, Scruggs, Hauth, & Allen- Brohaugh 2012).

So the picture that is forming is a system that has some considerable holes in it. There is a mathematics pedagogy that holds steadfast to a dying trend in education, teacher oriented classrooms. This antiquated pedagogy is compounded in the special education setting as lessons focus on strict adherence to DI techniques (though these techniques are especially effective for children struggling in mathematics). To make things even worse, this setting is forced upon traditionally low motivated students who have endured years of failure and disappointment. These students struggle in mathematics because of traditionally low motivation and a crushing mathematics environment. For general education students, there is a considerable amount of research about motivation and how both previous experiences and current environment effect the child’s motivation and performance (Gottfried, Marcoulides, Gottfried, & Oliver 2013). There is not, however, the same amount of information on struggling populations or sufficient information to explain the apathy in that learning support classroom.

The rest of this article will examine the various factors affecting motivation for struggling students in mathematics. First, the article will examine relevant research on the topic at this time, including predictors for both intrinsic and extrinsic motivations as well as different theories on what makes up motivation and what that means for struggling students. Second, the article will examine a series of data points that correlate intrinsic motivation with achievement in mathematics. Finally, the article will bring together the data and what it states
about intrinsic motivation and its effect on the achievement of struggling learners in mathematics.
Chapter 2

Relevant Research

Momentum Continuum: From Amotivation to Intrinsic Motivation

The research on motivation is well founded and has a strong historical basis. To begin to understand motivation, one must first understand the continuum by which motivation bases itself. Though often thought of as a very black and white construct, motivation within a learner extends from a purely intrinsic view of motivation to a very extrinsic view. For the purpose of this investigation it is worth taking a moment to look a number of types of motivation that exist on the motivational continuum. It is, however, prudent to acknowledge that these types of motivation do not come close to encompassing the whole continuum of motivational grades or begin to address the abundance of factors that can affect any given motivational situation (Deci, Koestner, & Ryan 2001).

It is best to begin with purely extrinsic motivation (types of extrinsic motivation) and move toward purely intrinsic motivation in discussing the differing motivational types. The first type of motivation is actually outside the realm of both extrinsic and intrinsic and that is amotivation. This is a child who is completely uninvolved and sees no need or purpose in engaging in the activity. Amotivation is the most tragic form of motivation and is often the result of years of failure and punishment (whether self inflicted or otherwise). Amotivation is often associated with learned helplessness (Perin, Bork, Mason, & Vaseleski 2011).

The next form of motivation is external regulation (extrinsic). This is a form of motivation where the child participates as part of a mandate from an outside force that they see as authoritative. This type of motivation is often associated with alienation. The child does not see meaning in the learning other than to avoid retribution from a more powerful source. The
next form of motivation is interjected regulation. This form of motivation presents with the child performing tasks as a means of avoiding anxiety, guilt or in order to enhance their ego. This form of motivation has been called ego-involved in the past, and is still a direct product of external factors influencing motivation. Moving toward intrinsic motivation the child begins to present with more self-determined and autonomous forms of motivation. The next motivational stage along the continuum is called identification. In this stage of motivation children begin to identify with the importance of tasks. The child realizes that tasks are crucial to larger learning constructs and, for that reason, engage in the task. These children still do not take part for enjoyment and still feel outside pressure (mainly from cultural constructs). The final and most autonomous and intrinsic like form of extrinsic motivation is integrated regulation. This form of motivation shares many similarities with intrinsic motivation. The child has taken full responsibility for the tasks and understands its importance for his or her goals in life.

However, the child still sees something else as the reinforcer for the task outside of the task itself. When the child moves into the realm of intrinsic motivation, they begin to see the task itself as satisfying. The child uses the task as a means of internal reinforcement and needs no outside reinforcer to engage in the task. Intrinsic motivation generally correlates with actual interest in the task. For a truly intrinsically motivated task, the child has to choose to participate in the task using their own free will. In any motivational situation, this is what a teacher strives for. In our continuum, the distinction between extrinsic and intrinsic motivation is the only one that is relatively steadfast. When the motivation for a task changes from an external to internal one sees incredible changes in the child’s performance and self-image (Deci and Ryan 2000).
Motivational Theories and a Comprehensive Picture

With a basic understanding of the different kinds of motivation ranging from amotivation to intrinsic motivation, it is important to discuss the theories about the development and maintenance of motivation. After discussing a number of fundamental motivational theories, it will be important to take a moment at the end to discuss how these theories overlap to form a cohesive picture of motivation. First, there is the expectancy value theory of motivation. This theory posits that there are two major indicators that predict a child’s motivation and subsequent involvement in any particular task. The first indicator is the child’s expectancy for the specific task. The idea of expectancy closely resembles the idea of self-concept (Klassen and Lynch 2007). How the child feels about themselves and their potential success on a given task makes up the child’s expectancy for the task. Within the construct of expectancy there are almost innumerable other contributing factors which cannot be discuss within the scope of this paper. Some of these factors include gender beliefs, short term and long-term beliefs, self-concept of ability for task, and perception of task demands. Additionally, an important construct is the child’s perception of locust of control. This construct describes where the child places control over the specific event. An internal locus of control means the child believes they control their own success in the task while an external locus means the child believes they have little say in their own success in a specific task (Wigfield and Eccles 2000).

The second construct is value. Value is the child’s desire to participate. As the name explains, this construct describes the value that the child sees in taking part in the activity. Again, the idea of value is predicated on a number of other constructs. Similar to expectancy, value is decided by the child’s past experiences. Other factors that effect values are incentive value, utility value and cost (eg. opportunity cost or the idea that time spent doing one task could potentially take away from doing another more rewarding task) (Wigfield and Guthrie 1996)
These two constructs, expectancy and value, work together to form motivation for a child. The interplay between these two factors predicts motivation for a specific task. If both constructs are high for the child, then motivation will be extremely high. In this situation the child expects to perform well on the task (high expectancy) and sees value in participating in the task (high value), which leads to high motivation. If either construct is low then engagement and motivation will suffer. Take for example a child who is participating in a four-piece puzzle. The child’s expectancy for the task is extremely high. It is a simple task the child has accomplished a number of times and the child knows that he will succeed. The child’s value, however, is low because he sees no need to do the task. It offers no intrinsic pleasure and holds no external reward. Expectancy is high but value is low so the child will not engage. Conversely, a situation where the value is high (playing basketball for someone who loves the sport) but expectancy is low (the players are too good) will lead to low motivation. In this situation, the child values the task for intrinsic reasons but does not see themselves succeeding (perceived competence) so they choose not to engage. In situations in which both constructs are low the child will experience amotivation. The child sees no value in participating in the task and also does not expect to succeed so they make no move to participate. In this discussion, the interplay between value and expectancy is very black and white. It is, however, important to mention that it is not as simple as previously discussed. Extremely high value or expectancy can negate a low secondary construct. Additionally, there are many constructs outside of expectancy and value that also affect how a student’s motivation forms and changes (Wigfield and Eccles 2000).

The second theory, which can arguably be placed within the realm of child expectancy and self-perception, is the self-determination theory. This theory strives to explain motivation within a social and cultural setting. It attempts to explain how external factors combine to
influence self-perception and create a child’s specific motivation toward a task. Conditions in an
environment that support a student’s strive for autonomy, competence and relatedness will foster
higher levels of motivation. Conversely, factors that hinder any of these indicators will inhibit
high motivation and drive amotivation (Deci and Vallerand 1991).

Autonomy is the idea that a child has control over the specific event that they are
participating in. This means that the child has some sort of sense of choice in the task. Though
not the same the construct, autonomy walks hand in hand with the previously discussed idea of
locus of control. If the child feels an internal locus of control, meaning that they feel that they
determine their success in the task, and a high level of autonomy, the child will have complete
power over a learning situation. In the current educational climate, these two constructs suffer
greatly. The lack of autonomy the teacher’s feel in the classroom relays to the children.
Children feel they have little control over their own learning as far a subject matter and pacing.
Locus of control is often external as well. Children see learning as a fixed process (meaning it
relies on inborn skills and is not the result of effort) and the teacher determines the difficulty of
the task and sets the student’s potential for success. This is one of many motivational
shortcomings in education today (Moran, Diefendorff, Kim, & Liu 2012).

Competence is the idea that a child can succeed in a specific task. A child’s actual
competence in a task and perceived competence are two completely different ideas.
Competence is the level at which a child achieves on a certain task. Perceived competence is
how the child believes they will achieve or have achieved on a specific task. These two
constructs can and often are completely divergent. Perceived competence can be thought of
similarly to expectancy. Perceived competence is an extension of the child’s identity in a
specific area of study. Over years of actual and vicarious performance, the child develops
ability beliefs. These ability beliefs, as well as other environmental factors make a picture in the
child’s
mind of how they will perform on a specific task (Cocks and Watt 2004). Before engaging, the child develops a picture of how competent they are in a learning situation. Perceived competence is a flexible construct within a child and can be changed. This is not to say that the change will be simple. Often, perceived competence is the result of many years of experience and as such is a very solid construct in the child’s mind. Unfortunately, many teaching techniques in schools reinforce a fixed framework of learning, meaning children see skills as fixed and immovable. This often means that the child sees perceived competence in a task as an immovable idea and they feel confident in their ability to predict how they will perform in a task whether it be good or bad (Johnston, 2012).

Relatedness refers to a child’s feeling of inclusion within an environment. The child is able to easily relate to the learning environment as well as the teacher, other children, and task. Relatedness looks at how the child functions in the current educational environment. It takes into consideration how the teacher has arranged the classroom, how long the child has been in the situation, the child’s familiarity with the factors in a given learning situation, and how the child sees themself fitting into that learning context (Moran, Diefendorff, Kim, & Liu 2012).

These three constructs often play off of each other to create a more coherent motivational picture. Similar to how expectancy and value worked together in the expectancy value theory, depending on the levels of these three constructs the child will or will not engage in a specific learning situation. For example, if the child has a high level of competency and relatedness but low autonomy, they may not engage because they see no control over the task they are asked to
partake in. Only when all three of these constructs are sufficiently high will the child be motivated in a task (Klassen, Robert, & Shane 2007).

The cognitive evaluation theory is a subset of the self-determination theory. It discusses how the two concepts, competency and autonomy (and locus of control), are ultimately linked if the goal is intrinsic motivation. A child must feel competence and have a sense of autonomy in a task for them to be intrinsically motivated to participate in the task. If the child’s expectancy is low they will not be intrinsically motivated because of a fear of failure. If there autonomy is low they will not be intrinsically motivated because they will not feel control over the task and most likely withdrawal. Furthermore, a cornerstone of intrinsic motivation is self-choice which is indicative of autonomy. (Deci, Vallerand, Pelletier, & Ryan 1991)

When looking that these theories in conjunction with each other an overall picture of motivation forms. If the expectancy value theory (EVT) is used as an overarching basis, the two other theories discussed fit relatively nicely into it. The self-determination theory (STD), which is further explained by the cognitive evaluation theory (CET), has competence as one of its main predictors. Competence matches expectancy in the EVT. Both theories agree that perception of self (self concept) plays a huge role in determining motivation. The one pitfall of the EVT is that it seems to leave out the current environmental factors involved in any learning situation. This is why adding the SDT is important. The ideas of autonomy and relatedness fill the holes in the EVT.

So with the theories together, the basis for understanding motivation looks something like this: There are three important factors that contribute to motivation in any learning situation. First, there is the child’s sense of self and potential for success. The combination of expectancy and competency leads to an idea similar to self-concept in the specific learning domain. Second, there is the child’s sense of value for a given task. The child must see the task as worthwhile in some way in order to engage. Finally there is the child’s sense of surrounding,
such as their current environmental factors. This includes the child’s sense of autonomy, idea of locus of control, and sense of relatedness. If you take all three you can see why a child engages or does not. You can also see why different forms of motivation arise. Generally if the value for the task is external then the motivation will be as such. If any of these three constructs is low there is a risk of amotivation and the child will choose to partially or completely disengage in the task.
Chapter 3

How Motivation Affects Struggling Mathematics Students and Related Questions

The article began by looking at the major theories in motivation and how they form the common types of motivation within the spectrum between amotivation and intrinsic motivation. So the question is, how do these motivational theories affect the actual students in a mathematics situation? The theories outline how one could predict a how a given student will react to a given motivational situation. So considering the theories one can begin to form a cohesive picture of how a student may react with regards to a mathematics situation. The major factors that predict achievement in any situation (in this case mathematics) are autonomy, expectancy (competence), value, and relatedness. This means that in a mathematics context the child’s motivation will be based on dimensions that are either directly related to, or subsets of, the previously mentioned constructs. Though observing all the dimensions of these constructs is out of the scope of this paper, it will look at interest/enjoyment (value), perceived competence, effort/importance (value), pressure/tension (autonomy), perceived choice (autonomy- locus of control), value/usefulness (value), and relatedness (Deci and Ryan 1985).

Looking at previous research, is it understood that all of these dimensions come into play when observing motivation in mathematics students. Deci and Ryan outline the intrinsic motivation of standard achieving mathematics students across the previously discussed dimensions. In reevaluations of the original study, Deci and Ryan have expanded on the original dimensions to look at a series of other factors outside of the conversation for this article. The consensus is that for a child to be truly intrinsically motivated in mathematics they must show high levels for all these dimensions with the noted exceptions being the pressure and tension dimension which must be low. The levels of these dimensions can vary but generally result in different forms of extrinsic motivation. If any dimension is particularly low (or high in the case
of pressure) or if the general state of all dimensions is low the child will move into amotivation and choose not to engage in the activity (Deci and Ryan 1985).

This article will be looking at the same information Deci and Ryan have for their various pieces. The exception is that the article will examine a shifted focus group. Whereas Deci and Ryan observed standard achieving students in mathematics, the article will be looking at children who struggle with mathematics. With any luck, this the article will be able to see what dimensions differ (if any) for these students and what dimensions become more or less important. For the purpose of this article the question is, what dimensions of motivation predict achievement in mathematics for struggling students (Deci and Ryan 1985)?

Sub questions that will not be addressed in this article include but are not limited to: how do each of these dimensions individually affect a struggling mathematics student, how could a classroom foster these specific dimensions for a struggling student, and why are these specific dimensions important for struggling students? This is discussed further in the future questions section.
Chapter 4

Methods

Participants

The experimental group for this study was struggling seventh grade mathematics students in a central Pennsylvania School District. The students were recruited through the Assistant Director of Special Education for the school district. Despite working through the office of Special Education, not all students in the study are in Special Education. All students were at risk of or current experiencing difficulties in mathematics.

Eighteen struggling mathematics students participated in the study in the grades of 7 and 8. To ensure complete confidentiality in this study no personal descriptions will be given for the students. As you will see in the data section all the data is presented as aggregate. Of the eighteen students there is a mix of age (ages between 7th and 8th grade), gender, and various other non-relevant distinguishers. The only common factor is that each student chosen and recruited was a student struggling in mathematics either in Special Education or outside of it.

Materials

For my materials the study used 2 indicators to link motivation to mathematics achievement. The first indicator was a Curricular Based Measure (CBM) that would situate the students roughly in their respective skill levels. The CBM was taken from easycbm.com. It is a mixed mathematics CBM for 7th grade curriculum. See appendix 2 for an example of the CBM administered.

The second indicator is a motivational survey taken from Deci and Ryan on Self Determination Theory. This indicator has been replicated and expanded on in many other studies that Deci and Ryan completed. The indicator lists out a series of statements by which the student
must rate their level of agreement on a scale of 1-7. Each statement is situated in a category measured by the indicator. The categories include, interest, perceived competence, importance, tension, perceived choice, value, and relatedness. See Appendix 1 for the motivation indicator used during the study.

**Procedure**

1) The first step of the research was securing participants. An administrator for the School District completed most of the effort. She took into consideration the academic records of potential participants, current class placements, as well as other information including teacher evaluations and current testing scores.

2) The second step was gaining consent. As the students in the study were all under 18 parental consent was necessary. Information packets on the study were given to parents and the parents were afforded the opportunity to contact the principal researcher with any questions they had about their children. Written consent was gained through consent forms for the child to participate in the study. Potential participants were able to choose if they wanted to participate in the study.

3) Upon receiving final consent the two indicators were administered. During two school visits, the indicators were administered to 18 student participants. For each group, approximately one class was missed to conduct the research and collect the data. Information was provided to the student ensuring them that they could at any point ask questions about the study or remove themselves from the data collection and overall study. The CBM was administered first and than the motivation indicator.
Confidentiality

It is worth taking a moment to acknowledge that at all times during the data collection process the data was kept in lockboxes (1-consent forms 2-day one data 3-day two data). All data brought to the office was subsequently not removed for the remainder of the study at which time it was destroyed.
Chapter 5

Data

This study is attempting to find general trends in the data that can begin a discussion on intrinsic motivation and children who present with struggles in mathematics. What this study is not is an attempt to prove definitively how intrinsic motivation affects mathematics achievement. The study will be presenting descriptive statistic.

Data Recording

As discussed in the materials section there were two indicators used for this study. The first was a 7th grade curricular-based measure and the second was an intrinsic motivation scale (both are in appendix 1 and 2). The scoring for these two indicators was relatively simple. The CBM was scored on a scale from 0 to 16 (the number of problems on the CBM). The CBM was scored against a teacher copy for the CBM. Points were either awarded or not based on the correct answer of the multiple choice selections for that problem. No points were awarded for work that was present on the CBM.

The Intrinsic Motivation Indicator (IMI) was scored based on the guidelines of the study it was taken from. (Deci and Ryan 1985) The participant taking the indicator marked each question on a scale of 1-7. These question scores are tallied, giving overall scores for each of the categories and the indicator as a whole. If a question is marked (R) then this question is to be tallied as a negative (see indicator in appendix 1). Thus the tallying would look similar to this: This activity was fun to do-7, I though this activity was boring(R)-1 making the total for those two questions 6.
What follows is a chart of the overall tallies. It shows each participant, how they scored on the CBM, how they scored overall on the IMI and how they scored on each of the categories of the IMI.

<table>
<thead>
<tr>
<th>Name</th>
<th>CBM Score</th>
<th>Overall IM score</th>
<th>Interest</th>
<th>Perceived Competence</th>
<th>Effort/Importance</th>
<th>Pressure/Tension</th>
<th>Perceived Choice</th>
<th>Value/Usefulness</th>
<th>Relatedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>88</td>
<td>9</td>
<td>21</td>
<td>18</td>
<td>11</td>
<td>7</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>86</td>
<td>11</td>
<td>28</td>
<td>17</td>
<td>4</td>
<td>-3</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>52</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>-6</td>
<td>-24</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>39</td>
<td>-9</td>
<td>11</td>
<td>19</td>
<td>5</td>
<td>-33</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>81</td>
<td>29</td>
<td>32</td>
<td>19</td>
<td>-5</td>
<td>-33</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>61</td>
<td>12</td>
<td>21</td>
<td>11</td>
<td>2</td>
<td>-7</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>88</td>
<td>15</td>
<td>23</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>26</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td>4</td>
<td>-22</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>62</td>
<td>5</td>
<td>27</td>
<td>11</td>
<td>10</td>
<td>-16</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>14</td>
<td>106</td>
<td>30</td>
<td>15</td>
<td>15</td>
<td>-6</td>
<td>1</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>11</td>
<td>15</td>
<td>28</td>
<td>6</td>
<td>24</td>
<td>-1</td>
<td>8</td>
<td>-22</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>14</td>
<td>16</td>
<td>1</td>
<td>27</td>
<td>2</td>
<td>3</td>
<td>-25</td>
<td>9</td>
<td>-1</td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td>60</td>
<td>13</td>
<td>20</td>
<td>15</td>
<td>-2</td>
<td>-15</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>14</td>
<td>11</td>
<td>101</td>
<td>19</td>
<td>26</td>
<td>11</td>
<td>10</td>
<td>4</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>101</td>
<td>26</td>
<td>25</td>
<td>17</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>6</td>
<td>68</td>
<td>17</td>
<td>12</td>
<td>7</td>
<td>8</td>
<td>-5</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>-22</td>
<td>1</td>
<td>6</td>
<td>-4</td>
<td>-10</td>
<td>-10</td>
<td>4</td>
<td>-9</td>
</tr>
<tr>
<td>18</td>
<td>4</td>
<td>131</td>
<td>29</td>
<td>27</td>
<td>18</td>
<td>5</td>
<td>3</td>
<td>28</td>
<td>21</td>
</tr>
</tbody>
</table>

Overall CBM and IMI scores (Table 1)
If you were to break down the data in four classes highest achieving, high achieving, low achieving, and lowest achieving the data becomes easier to decipher. The highest achieving group would represent anyone who scored a 14 or 15 (there are 5 members of this group). The high achieving group would represent anyone who scored a between an 11-13 (there are 4 members of this group). The low achieving group would represent anyone who scored a 9 or 10 (there are 4 members to this group). The lowest achieving group would represent anyone who scored between a 2 and 6 (there are 5 members in this group). What follows in a chart that breaks down these four groups and the average score on the CBM, the overall IMI, and all of the subsequent categories for the IMI.

<table>
<thead>
<tr>
<th>Category Achievement</th>
<th>CBM Score</th>
<th>Overall IMI Score</th>
<th>Interest</th>
<th>Perceived Competence</th>
<th>Perceived Effort/Importance</th>
<th>Perceived Pressure/Tension</th>
<th>Perceived Choice</th>
<th>Value/Usefulness</th>
<th>Relatedness</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-15</td>
<td>14.6</td>
<td>64.8</td>
<td>11.4</td>
<td>23</td>
<td>10.2</td>
<td>4</td>
<td>-8.4</td>
<td>15.8</td>
<td>8.8</td>
</tr>
<tr>
<td>11-13</td>
<td>12</td>
<td>69.25</td>
<td>9</td>
<td>20.75</td>
<td>12.25</td>
<td>7</td>
<td>-7.5</td>
<td>14.5</td>
<td>11</td>
</tr>
<tr>
<td>9-10</td>
<td>9.75</td>
<td>53</td>
<td>6.5</td>
<td>15.5</td>
<td>16</td>
<td>-0.25</td>
<td>-15.8</td>
<td>20.25</td>
<td>11.8</td>
</tr>
<tr>
<td>2-6</td>
<td>3.8</td>
<td>71.8</td>
<td>20.4</td>
<td>20.4</td>
<td>11.4</td>
<td>1.8</td>
<td>-9</td>
<td>15.4</td>
<td>11.4</td>
</tr>
</tbody>
</table>

As you can see from the two charts the data collection was relatively simple. The comparison is between the performance on the CBM to the overall and categorical scores for the IMI.
Chapter 6

Analysis (Trends)

What follows is a look at the overall trends in the data. Following will be an attempt to explain each of these trends and why they are important and how they came about.

1) Overall IMI score does not seem to correlate with achievement on the mathematics indicator. As you can see, the students who scored the lowest on the CBM average a 71.8 on the IMI, the highest average of the four categories. Furthermore the 11-13 categories also scored higher than the 14-15 group on overall IMI score. Two of our four lowest IMI individual scores were seen in the highest CBM scoring group.

2) Perceived competence seems to predict overall achievement on the CBM relatively well. Though the lowest group rated higher on perceived competence than the low group, the general diminishing of perceived competence score related well to the general diminishing scores on the CBM.

3) Relatedness seems to be inversely related to the scores on the CBM’s. Those who perform more poorly on the CBM seem to feel more relatedness with concerns to their classroom and their teacher.

4) Interest and pressure seem to roughly predict scores on the CBM’s, while effort, perceived choice, and value seem unrelated and do little to predict the scores on the CBM’s.

Analysis (Discussion of trends)

Overall IMI Score and Correlation to CBM Score

From what the data shows, it would seem that the overall score on the IMI does little to predict achievement on the mathematics CBM (indicator of general performance). This is strange, as from what our research would predict the overall score for IMI should predict scores on the CBM. If CBM substitutes for general achievement and the IMI substitutes for
general intrinsic motivation the correlation should be there. Students that present with high intrinsic motivation also present with high achievement.

So if the IMI does not predict achievement on the CBM then what does that say about motivation in this shifted experimental group? Is this data enough to say that intrinsic motivation is not a predictor of achievement for mathematics in students who struggle? In a word-NO. Though a bit baffling, this result was not unforeseeable and could potentially be explained by various phenomenon. The most likely of which is pitfalls in the experimental design. It is likely that the small sample size as well as the IMI and CBM not being perfectly valid substitutes for their respective constructs would confuse a phenomenon (intrinsic motivation predicting achievement) that is all but considered fact within motivational research. Outside of research design being an issue (of which a later section will be devoted) there is the idea of metacognitive awareness. In order to fill out the IMI, students need a certain level of metacognitive awareness. The students need to be able to look at themselves as learners and answer relatively difficult questions on choice, competence, and value. In three of our four categories in our breakdown (highest, high, and low), I see relatively reliable trends in the data. However, our lowest category seems to throw a wrench in things. These students may not have had the metacognitive abilities to accurately evaluate themselves as learners. As such, they may have drastically overestimated ability (perceived competence) as well as other fields. In turn, these students may have very high motivation while achieving poorly because they do not yet grasp a concept of their own learning. Conversely our highest achieving group presents with some of the lowest overall scores. These students may have achieved a level of metacognitive
awareness that associates with being acutely aware of their own motivational misgivings. These students present with low overall motivation despite strong scores. The upshot of this trend is that motivation is complicated as a construct. Overall motivation scores may not be the best indicators of achievement as there are so many aspects of learning that we must observe more closely. (Reid, Harris, Graham & Rock 2012)

**Perceived Competence Predicts Achievement**

From this data, this seems like the only predictor that worked out almost perfectly. Of our four categories, the decreasing average score on perceived competence predicts the decreasing scores on the CBM. Scores on this indicator in relation to achievement follow predictions based on what the research says on average achieving students. Perceived competence is one of the most important indicators of achievement. Perceived competence is how well the student believes they achieve in a certain domain (in this case on the task). Perceived competence relates closely to what a layperson would see as confidence. The student believes they will succeed and, therefore, will achieve. This data confirms that claim. Those that believed they were stronger in this specific domain performed better on the CBM. Overall implications of the data collection for this study will be discussed later but it is worth mentioning here that perceived competence is the only category that predicts achievement on the indicator. As such, it will be worth posing the question in further research of struggling mathematics students how this specific indicator affects mathematics and if it factors more prominently into performance for children who struggle than general achieving students?

**Relatedness Inversely related to Achievement**

Perhaps the strangest trend in the data is that relatedness seems to be inversely related to achievement on the CBM. Those who have lower scores rate higher on the relatedness category.
Relatedness speaks to how the student feels about their specific environment. A higher score on the indicator shows that the student feels more comfortable with the teacher and their environment. We know that relatedness is an important indicator of intrinsic motivation and in turn achievement for general achieving students. Here, however, it seems to have little affect on the achievement of the students. Though it is far to early to completely throw out a highly researched educational idea (relatedness predicts achievement), it is enough to merit a moment of thought on the dynamics of a struggling student’s classroom and how that may shift the importance of relatedness in students who struggle in mathematics.

Each of the classrooms used for the data collections (and many, if not most mathematics classes for struggling students) are pull out resource room type classes. In these environments, the students spends perhaps one period a day in the classroom. Moreover, the students spend relatively little time with the teacher (compared to classrooms in which the teacher teaches all or most subjects). This could perhaps predict why the relationship to the classroom and the teacher becomes less important in the classroom for struggling learners. Higher achieving students do not see relatedness as necessary for their own achievement due to the fact that they are the ones who are rarely in the pullout classroom. Though this fact could perhaps predict fluctuation in the scores for relatedness, the fact that this score is inversely related to the achievement does seem a bit baffling. Perhaps the students who struggle more get more attention from teachers and in this way feel closer to the teacher (higher relatedness). In this case the achievement would predict the relatedness and not the other way around. It goes to show how difficult it is to separate out achievement from motivation and how the two forces predict and are predicted by each other.
Rough Predictors and Non-Predictors

The rest of the categories seem to predict roughly the achievement score or do not resemble any predictive trend to the achievement data. This phenomenon is to be expected in any data set just given fluctuations in student and study parameters.

Interest and pressure both seem to be rough predictors of achievement. Both of these show gradual decrease in score averages for the four achievement groups. Interest states how much the specific student believes that the category is enjoyable. We see in this category that the lowest achieving group viewed the task as most enjoyable followed by the highest, high and low groups. Though one would not expect the lowest group to rate the task so highly it is not unreasonable for someone who struggles in mathematics to not enjoy specific tasks. The situation of the experiment also may have adjusted the data. Enjoyment is often strongly associated with pressure in the situation. When a situation is pressure filled lower achieving students generally see it as less enjoyable as they feel a high level of anxiety and fear. In this low-pressure setting, the lowest group would enjoy the less pressure task. Pressure similarly does a moderate job predicting achievement, the highest scoring group being the high group followed by highest, lowest, and the low. Though not a perfect predictor, this is what one would expect to see. Higher achieving students will feel less pressure in mathematics situations (higher scores on the pressure section of the IMI).
Shortcomings of the Study

Before concluding with discussion on the implications of this study, it is worth taking time to acknowledge the shortcomings of this study. This study suffered from three major shortcomings that presented themselves throughout.

First, the sample size was too small to make any concrete solutions or to apply rigorous statistical analysis to the data. Due to limitations on time and resources, the study based all data on of a total of 18 participants. Though this was enough to compile a fair amount of data and look at trends, it did mean that the data was subject to fluctuations caused by single participants. This meant that any participants who presented as abnormal, in terms of not agreeing with conventional knowledge or other subjects, would have much more sway over the findings of the study. This is just one of the many complications that small sample size presents to a study.

Second, the IMI necessitated a certain level of metacognitive knowledge as well as basic reading and linguistic comprehension skills. In designing the study skills outside of mathematics necessary to complete the study were taken for granted. It is possible that a student’s comorbid disability in reading, writing, or language, could have impeded their ability to properly participate in the study. This could in turn affect the final data collection and confuse the overall message of the study.

Finally, the two indicators used to stand in for much more complex constructs (the CBM for overall mathematics achievement and the IMI for overall intrinsic motivation) may not have been perfectly valid. Again, due to lack of resources and time constraints these two indicator were used as stand ins for much more comprehensive summaries of achievement and motivation (grades, full interviews, ext.). Again these imperfect summaries may confuse the overall conclusions of this study.
The upshot of these shortcomings is that any conclusions made in this study are ones that will not stand up to statistical scrutiny. From the beginning, this study was meant to begin a conversation on motivation in mathematics for a shifted focus group. The combination of small sample size, possibility of uncontrolled experimental variables, and questionable validity of the indicators means that all conclusions are tentative. In fact, anyone who reads this paper are invited to do further research on all of the claims made. The work done has its issues and neither claims to, nor was it ever meant to, change the field of motivation in mathematics. It was meant to open up avenues by which people can begin to question how motivation changes for students who struggle. For these expressed goals the parameters of the study were sufficient.
Chapter 8

Discussion

So considering the trends in the data and the potential shortcomings of the experimental design, what dimensions of motivation predict achievement in mathematics for struggling students? It is difficult to take any of the data that is contrary to conventional knowledge and say definitively that this proves anything about the new population. So to say, for example, because in this study the IMI overall score did not predict achievement than intrinsic motivation is not a predictor of achievement in students who struggle, would be absolutely foolish. There are, however, certain trends in the data that either match conventional knowledge or make sense within the parameters of the specific environment. These findings may give us some insight into how to begin the conversation on how student who struggle may differ from general achieving students with regards to intrinsic motivation.

First, the scores for relatedness were inversely correlated to the scores on the CBM. Though this does not suggesting that for student who struggle relatedness harms achievement, these data do suggest that it may not be as important or is perhaps less emphasize in the classroom environments on students who struggle. In the analysis, it was noted that the transient nature of the resourse room may contribute to the fact that students do not feel as connected to the environment or the teacher. This data seems to suggest that this connectedness may not be a huge issue. The students who performed well on the CBM rated the lowest on relatedness. Also, there is the potential that these students who achieved high and rated low on relatedness may benefit from a higher relatedness scores meaning, that making them more comfortable in their changing environments may improve their scores. (Masropieri, Scruggs, Hauth, & Allen-Bronaugh 2012)
Second, perceived competence seems to be the best predictor of achievement for the students. This is not surprising as it is one of the more important predictors in the general populace. After seeing the data and acknowledging what is known about students who struggle, to think that perhaps this construct holds more weight with this population is not hard to believe. Children who struggle are often scarred after years of failure. As such, perception of self and identity within academic domains becomes very important to these students. The students may closely tie self worth to perceived competence making it an extremely important construct. Therefore, how a child perceives himself or herself as a learner or for a specific task may have even more weight on achievement than for a standard achieving student. (Gottfried 1985)

So with this data a trend emerges. Much of the data is sporadic and does not suggest any difference between the standard achieving populace and the special education population. For the 18 participants in the study, perceived competence predicted achievement and relatedness inversely predicted achievement. This could show a more significant emphasis put on perceived competence and less emphasis placed on relatedness in this group of children.
Chapter 9

Moving Forward

So with this introduction to a shifted focus group within the domain of intrinsic motivation and mathematics there is much need for more research. First, it would be prudent to conduct a study similar to this with more extensive indicators of motivation and achievement to corroborate the findings that perhaps perceived competence is more important and relatedness is less. Furthermore, researching looking into each of these categories to see exactly why each differs from what is seen in standard achieving students. Finally, with this information we could look at how to foster the more important intrinsic motivation domains within the classroom. It is also worth taking a moment to consider what this study means for classroom teacher and what could be done moving forward to make this information more applicable to the classroom. The study tells us that for students who struggle in mathematics perceived competence matters. This means that a classroom should be designed to constantly have students achieving at a high level of success as they learn. Fostering perceived competence is the first step to truly allowing a student to be motivated. Second, it is clear that relatedness has some sort of affect in the achievement of struggling learners. Though we have yet to flesh out exactly why we see a difference, the difference exists. More research is needed, but at this time we know that relatedness may be an important factor in the classroom for aiding student achievement. More research is needed to truly show how these results could be applicable in the classroom, however, this study does show evidence that perceived competence is perhaps the most important factor in aiding struggling students with motivation.
Work Cited


Appendix 1: Motivation Scale

**Intrinsic Motivation Scale**

For the following items indicate on a scale of 1 to 7 how much you agree with each statement. A score of 1 would be completely disagreeing with the statement and a score of 7 being completely agreeing with the statement, making a score of 4 neutral to the statement. Circle the number for each answer that you think corresponds to how you feel about the statement (the number scale will be below the statement). For the items that there are blanks fill in the blanks to the best of your ability to make the statement a true statement.

**Interest/Enjoyment**

I enjoyed doing this activity very much

[ 1 2 3 4 5 6 7 ]

This activity was fun to do.

[ 1 2 3 4 5 6 7 ]

I thought this was a boring activity. (R)

[ 1 2 3 4 5 6 7 ]

This activity did not hold my attention at all. (R)

[ 1 2 3 4 5 6 7 ]

I would describe this activity as very interesting.

[ 1 2 3 4 5 6 7 ]

I thought this activity was quite enjoyable.

[ 1 2 3 4 5 6 7 ]

While I was doing this activity, I was thinking about how much I enjoyed it.

[ 1 2 3 4 5 6 7 ]
Perceived Competence

I think I am pretty good at this activity.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

I think I did pretty well at this activity, compared to other students.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

After working at this activity for a while, I felt pretty competent.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

I am satisfied with my performance at this task.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

I was pretty skilled at this activity.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

This was an activity that I couldn’t do very well. (R)

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

Effort/Importance

I put a lot of effort into this.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

I didn’t try very hard to do well at this activity. (R)

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]

I tried very hard on this activity.

\[
\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}
\]
It was important to me to do well at this task.

[ 1 2 3 4 5 6 7 ]

I didn’t put much energy into this. (R)

[ 1 2 3 4 5 6 7 ]

**Pressure/Tension**

I did not feel nervous at all while doing this. (R)

[ 1 2 3 4 5 6 7 ]

I felt very tense while doing this activity.

[ 1 2 3 4 5 6 7 ]

I was very relaxed in doing these. (R)

[ 1 2 3 4 5 6 7 ]

I was anxious while working on this task.

[ 1 2 3 4 5 6 7 ]

I felt pressured while doing this task.

[ 1 2 3 4 5 6 7 ]

**Perceived Choice**

I believe I had some choice about doing this activity.

[ 1 2 3 4 5 6 7 ]

I felt like it was not my own choice to do this task. (R)

[ 1 2 3 4 5 6 7 ]
I didn’t really have a choice about doing this task. (R)

[ 1 2 3 4 5 6 7 ]

I felt like I had to do this. (R)

[ 1 2 3 4 5 6 7 ]

I did this activity because I had no choice. (R)

[ 1 2 3 4 5 6 7 ]

I did this activity because I wanted to.

[ 1 2 3 4 5 6 7 ]

I did this activity because I had to. (R)

[ 1 2 3 4 5 6 7 ]

Value/Usefulness

I believe this activity could be of some value to me.

[ 1 2 3 4 5 6 7 ]

I would be willing to do this again because it has some value to me.

[ 1 2 3 4 5 6 7 ]

I believe doing this activity could be beneficial to me.

[ 1 2 3 4 5 6 7 ]

I think this is an important activity.

[ 1 2 3 4 5 6 7 ]

Relatedness
I felt really distant to my teacher. (R)

[ 1 2 3 4 5 6 7 ]

I really doubt that my teacher and I would ever be friends. (R)

[ 1 2 3 4 5 6 7 ]

I felt like I could really trust my teacher.

[ 1 2 3 4 5 6 7 ]

I’d like a chance to interact with my teacher more often.

[ 1 2 3 4 5 6 7 ]

I’d really prefer not to interact with my teacher in the future. (R)

[ 1 2 3 4 5 6 7 ]

I don’t feel like I could really trust my teacher. (R)

[ 1 2 3 4 5 6 7 ]

It is likely that my teacher and I could become friends if I interacted a lot.

[ 1 2 3 4 5 6 7 ]

I feel close to my teacher.

[ 1 2 3 4 5 6 7 ]

(Deci and Ryan 1985)
Math Nums Ops Algebra and Geometry 7_1

1. Each day that it is watered, a plant grows 1 inch. Which shows this?
   A. A  
   B. B  
   C. C

2. Truck Facts

<table>
<thead>
<tr>
<th>Truck</th>
<th>Cost in $</th>
<th>Time it can take</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20,000</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>22,000</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>40,000</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>35,000</td>
<td>24</td>
</tr>
</tbody>
</table>

Which costs 2 times as much as Truck 1?

A. Truck 3  
B. Truck 2  
C. Truck 4

3. 12 inches = 1 foot
   Kate is 6 feet tall.
   How many inches is this?
   A. 60  
   B. 18  
   C. 72

4. Triangle ABC is congruent to Triangle DBC

A. \( \frac{4}{3} \) in. 
B. 4 in. 
C. 5 in.
5. \[ m \angle F = 20^\circ \]

\[ m \angle G = \_ \_ \_ \]

A. 90°
B. 80°
C. 70°

A car goes 400 miles on 10 gallons of gas.
How many miles can it go on 30 gallons?

A. 500
B. 1400
C. 1200

7. How far to the doghouse?

A. 5 feet
B. 25 feet
C. 20 feet

Mona picks one shape without looking.
What is the chance that she will pick a triangle?

A. \( \frac{1}{5} \)
B. \( \frac{2}{5} \)
C. \( \frac{1}{3} \)
9. Giraffe Growth

Giraffe 2 will be taller than Giraffe 1 after ___ months.

A. 2
B. 3
C. 6

10. Square ABCD is similar to Square EFGH

HG = ___

A. 2 in.
B. 1 in.
C. 3 in.

11. Lu has 75 jellybeans.
   She eats 25.
   What % did she eat?

A. 75%
B. 25%
C. 33%

A car has 10 gallons of gas.
Sandy adds 0.25 gallons per second.
Which shows how much gas (y) is in the car after (x) seconds?

A. y = 10 + 0.25x
B. y = 10x + 0.25
C. y = 10 + 0.25
13. Truck Facts

<table>
<thead>
<tr>
<th>Truck</th>
<th>Cost in $</th>
<th>Time it can tow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20,000</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>22,000</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>40,000</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>35,000</td>
<td>24</td>
</tr>
</tbody>
</table>

Which Truck can tow \( \frac{3}{4} \) as much as Truck 4?

A. Truck 1  
B. Truck 3  
C. Truck 2

14. Triangle ABC has sides of 2 inches. Triangle DEF and Triangle ABC are congruent. How long is Side DE?

A. 4 inches  
B. 2 inches  
C. 60 inches

15. 190% of 16 = __

A. 3.04  
B. 304  
C. 30.4

\[ \frac{x}{42} = \frac{3}{7} \]

x = __

A. 18  
B. 98  
C. 2
Academic Vita

Cameron Butler

245 East Fairwood Drive
Chalfont PA, 18914

E-Mail: cmb5681@gmail.com
Cell-Phone: 267-884-4695

Education

Pennsylvania State University
Schreyer Honors College
Candidate for B.S. in Special Education
Candidate for M.S in Curricular Instruction (concurrent degree) May '14

Honors: Presidents Freshman Award ('09-'10)
Evan Pugh Scholar Award ('11-'12)
Dean’s List ('09-'10)

Relevant Coursework

Special Education 401: Behavioral interventions
Special Education 411: Children with multiple and severe disabilities
Special Education 418: Direct instruction methods
Special Education 409 A/B/C: Curricular design for children with LD in reading, writing, and mathematics
Special Education 495 E/G: Student teaching in autistic support and learning disabled classroom

LLED 500: Reading and language acquisition theory
LLED 545: Lesson design and implementation for intensive reading intervention
CI 595: Assessment and adjusting curriculum for reading intervention

Work History

Student Teaching (2012)
High School Emotional Support (January 2014-May 2014)
Provided research based mathematics and reading interventions
Wrote functional behavioral analyses and implemented positive behavior interventions
Co-taught in all academic subjects

Elementary Reading Specialist (August 2013-December 2013)
Implemented reading interventions
Worked with individual and small group instruction
Conducted initial evolutions including but not limited to IRI’s

LLED 550-595 Reading Camp (June2013-July 2013)
Provided research based interventions during summer camp for struggling readers
Designed and implemented personalized reading lessons for struggling readers

Elementary Pull Out Specialist (January 2013-May 2013)
Implemented initial evaluations in reading, mathematics, writing and behavior
Worked as pull out and push in co-teacher
Designed and implemented research based intervention for reading, mathematics, behavior, and writing
Used data based instruction to adjust curriculum
Elementary Autism Support (August 2012-December 2012)
Designed and implemented DI heavy lessons for children with ASD
Implemented behavior support plans for children with ASD

Personal Care Aid (May 2010-2012)
   Educational Paraprofessional/ Wraparound
   Provided research based practices to support a child with ASD in social situations

   Educational Aid
   Provided researched based interventions to support education of children with mild to moderate intellectual disabilities

Volunteering

Special Olympics (2010-Present)
   Assistant Coach
Big Brothers Big Sisters (2009-present)
   Big Brother
Council for Exceptional Children (2012-present)
   Co-founder and Vice President

Professional Qualifications

PECT Certified in Special Education K-12 (2013-Present)
   Certification to teach Special Education K-12
Praxis Certified in HS Mathematics and Science (2011-Present)
   Certification to teach HS Mathematics (Calculus) and Science (chemistry)
Praxis Certified in Reading Specialist (2011-Present)
   Certification to teach Reading and Language K-12
Language Corps Certified TESOL (2011-Present)