

**Making Math Matter - A Grant Proposal**

by

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ABSTRACT

Making Math Matter is a grant proposal from the Park Falls School District in Park Falls, WI to the Plum Creek Foundation, a division of Plum Creek Timber Company. It is based on the facts that most kids do not like math and, therefore, struggle with it and that many teachers who are currently teaching math do not have formal educational background within this subject and, therefore, find it difficult to teach math in innovative, effective ways. The proposal suggests that students and teachers can become more comfortable and more successful with mathematics if they are exposed to meaningful activities that reinforce and extend their current knowledge. The Park Falls School District is planning on starting annual events like an elementary school Math fair, a Family Math Night, and Math Career Day.

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## Chapter I: Introduction

The Park Falls School District is situated in the rural community of Park Falls, WI. It is located in the north central area of the state. Approximately 700 students are served from kindergarten to high school in one building. The Park Falls School District is struggling with getting all students to the “advanced” or “proficient” levels in mathematics on the state tests. The district is also battling with the fact that they have hired only one person with a math background in kindergarten through eighth grade. This has led to many of the teachers feeling inadequate about their ability to teach mathematics and to create activities that will get the students excited about math. The district is applying for the Plum Creek Timber grant so that the teachers will have opportunities to create math lessons and become more comfortable with teaching math, and also to inspire the students to enjoy the challenge of learning mathematics.

### *Statement of the Problem*

By 2014 all children must be proficient in reading and math according to the No Child Left Behind Act of 2001. However, almost all elementary school children and the majority of students in grades 7-12 do not have teachers who have a background in the teaching of mathematics. “A 1999 study conducted by the Council of Chief State School Officers revealed nearly 30% of middle and high school math teachers in the United States neither majored nor minored in the subject they teach” (National Council of Teachers of Mathematics, 1999, ¶ 2).

In addition to school districts struggling to hire qualified math teachers, they are struggling with the misconceptions associated with mathematics. Most kids do not like math, are anxious when doing math, and many even mirror their parents’ negative feelings toward the subject area. Statistics find that the majority of middle school students dislike math so much that they would prefer to do many typically distasteful chores than do math. Eighty-four percent have

even gone as far as to say they would rather clean their rooms, eat their vegetables, take out the garbage and go to the dentist than sit down with their math homework (Math, 2005).

Unfortunately, the longer something goes on the more difficult it is to change. The “hating” of math has gone on too long and it is time to show students (and parents) that math matters! Cavanagh (2007) found “creating courses that place a greater emphasis on real-world or ‘applied’ math, as opposed to simply increasing academic requirements, could not only improve students’ workforce skills, but also their enthusiasm for that subject” (p.1). Students need the age-old question answered: “When are we going to use this?”

It is understandable how the typical American math student can feel that math is boring and that they cannot do it. Math is often taught the same way everyday. Many classrooms showcase a stale, redundant math routine. Teachers need the opportunity to learn how to teach with manipulatives and games, how to create and assess meaningful projects, and how to teach with a combination of rote computational activities and constructivist methods. Murray (1998) found that most psychologists and educators agree that using a combination of both [traditional and constructivist] approaches is the most effective way to teach math.

The fact is evident that change is crucial. We are in the midst of math wars and debates on how to solve the problems with math education. The importance of students (and parents) to math education is being overlooked. Students will become active members of the math community if their parents are active parents in their education. However, there are parents who are reluctant to assist their children with math for several reasons. For one, they feel inadequate with their own math skills and therefore feel they could not help others. Another reason is that math is not taught how it was when they were in school. Still others have accepted their own theory that because they were not successful with math that certainly anyone with the same

genes could not be good at math either. On the contrary, Peters (1998) found that “even mathematically unsophisticated parents can become the natural partners of teachers if they are given the materials to use and the guidelines for using them effectively” (p. 2).

*Purpose of the Project/Grant Proposal*

The purpose the proposed grant is to acquire funds to allow the students in the Park Falls School District to have experiences that will make them successful in the area of mathematics. This school district can aim to try to hire additional teachers with experience and an educational background in math education, but we need to work to improve our situation as it currently stands. Park Falls’ teachers need opportunities to collaborate and to share knowledge and methods. The administration is willing to provide more time, but assistance is needed with compensating college professors and other experts in this field when they come to educate staff.

## Chapter II: Literature Review

Math is a subject that is often tolerated as a part of early education. Many teachers, parents, and students do not like math or feel that they are successful at it. One thought as to why students do not like math is because they fall behind when they have difficulty with a concept. This is especially frustrating in math because it is a cumulative subject, in which each concept builds off of the previous concepts. Therefore, when students do not understand a concept they fall behind and continue to fall further behind each year. Obviously, this becomes extremely frustrating for that student. Cabellaro (1995) suggests that children dislike math class not because they dislike math but because they dislike memorizing times tables out of context. Perhaps the method that is used for the memorization of times tables is what Teo (2003), a retired principal, calls a negative influence. She suggests that children start off school enthusiastic and positive, but develop anxiety and negative emotions when they are pushed too quickly through concepts or when they feel unsuccessful.

Part of the Making Math Matter grant proposal is finding ways to overcome the stereotypes that often accompany mathematics in our schools and in our lives. The literature that was reviewed examined aspects of math education such as qualification of mathematics teachers, math activities/events, the debate between constructivist and traditional math education, and teachers' and parents' feelings on mathematics.

### *The Kind of Math Matters*

No Child Left Behind has put increasing pressure on school districts to elevate the number of students that are "advanced" or "proficient" on standardized tests. By 2014, all children must be proficient in reading and math. In order for students to be proficient on the Wisconsin Concepts and Knowledge Exam (WCKE) their test scores must fit within a certain



range. For example, according to the Wisconsin Department of Public Instruction website, sixth grade students must score between 485-531 points to be “proficient” and they must score between 532 to a perfect 700 points to be at the advanced level. This means a student needs to only score a 69% to demonstrate competency in the academic knowledge and skills tested, according to the descriptor of proficiency used by the WKCE.

The question is how should math be taught so that students learn the computations and how to apply them to their lives and future careers? There is a great deal of debate over which should be the priority when teaching math: basic facts or application? These two types of thought are often referred to as traditional (computational) math and constructivist (hands-on, authentic) math.

According to a study conducted by Standing (2006) “the teaching and practice of basic arithmetic skills in North American school and university systems has declined greatly in the last seven decades” (p. 157). Bridget Murray, an avid supporter of traditional math, states that bypassing the math facts and the drilling that goes along with them bypasses the core aspect of mathematical education (1998). Many people, especially parents and veteran teachers, believe that the way they learned math is what worked for them and will work for their children. Unfortunately, as Hartocollis (2000) found, there is a misconception that in the “good old days” everybody could easily do the basics of mathematics. That may be why it is so difficult for many adults to understand why there seem to be so many students in American schools today that are unable to do simple things, like multiply. Although there may have been very little change in how well students learn math, there is a significant amount of change in how progress is monitored (i.e. state tests, No Child Left Behind). In addition, the expectation for what a child should learn in each grade level has increased significantly.

Contrarily, enthusiasts of constructivist, or new math, argue that the methods of teaching math through the memorization of math facts and rules has done nothing but produce people that hated math and really never understand what they were doing (Hartocollis, 2000). Constructivist math can be traced back to the work of Piaget. In this view, individuals construct their own knowledge based on previously constructed knowledge. One of the main differences about this view in comparison to traditional math is that it sees a learner as an active participant not as a blank canvas to be painted. As an educator, that means that students should be much more active in their learning. They should be constructing their own theories and then reflecting on their work (Seldon, 1996).

In today's society and teacher education courses, it seems that the ideas associated with constructivist math are gaining ground. Sloan (1997) believed

That teachers should emphasize problem solving as a vital aspect of the mathematics curriculum. These strategies include: (a) relating the practical aspects of mathematics to everyday life, (b) developing self-confidence by encouraging students to trust their own intuitions, (c) teaching in a flexible manner which emphasizes many solutions and methods for solving problems, (d) utilizing a variety of methods for evaluation, (e) avoiding humiliating experiences such as forcing them to work problems alone at the chalkboard, and (f) providing a supportive classroom where students have many opportunities for a successful experiences (p. 11).

Making problem solving a crucial aspect of the math curriculum is also found to reduce math anxiety. An example of the type of problem that a student would be expected to solve is shown below. Note that these questions are from the released items of the WKCE.

*Geoffrey had a \$10 bill. He bought three ice cream cones. Ice Cream cones cost \$1.78 each, including tax. How much change did Geoffrey receive?*

That was an example of a sixth grade question. It is easy to see how someone would need the skills needed to solve this problem in real life scenarios.

Another example from the WKCE is as follows:

*Simon has 3 boxes with 8 crayons in each box. How many crayons does Simon have?*

That question was from the third grade math section. It not only provides the students an opportunity to show computational skills, but also higher lever thinking skills. This is because below the question the students need to use words to describe how they figured out their answer. As Aspinwall and Aspinwall stated “writing prompts provide a window into students’ understanding and mathematical thinking” (2003, p. 350). The 10<sup>th</sup> grade question below also utilizes skills that students need to have in their lives and also how important it is to be able to explain one’s mathematical thinking.

*Carla is earning money for a used car that costs \$1,500. Carla’s parents contribute \$1 for each \$1 that she saves. Carla saves \$10 from each lawn she mows. Carla mows three lawns per week. Carla estimates that with her parents’ help she should be able to purchase the car in 20 weeks. Explain whether or not Carla’s estimate is accurate.*

Cavanagh also points out “that creating courses that place a greater emphasis on real-world or ‘applied math,’ as opposed to simply increasing academic requirements, could not only improve students’ workforce skills, but also their enthusiasm for that subject” (2007, p. 1). In addition, middle school students reported that they would be more interested in math if they could relate what they were learning into gaining skills that would lead them to exciting, successful careers (“Math Negative Image,” 2005). However, with constructivist methods one

must be careful because, “In the hands of poorly trained teachers, nontraditional methods can cause children to get neither basics nor understanding” (Rothstein, 2000, p. 7).

There has been a lot of research on both theories on how math is taught best, but perhaps a moderate position is the best for our students. Even if the leaders in math education discussed methodologies it is unlikely to result in a decision as to what is the best way to teach mathematics. This is due to the fact that the country is so large that decisions about education are locally driven (Strauss, 2004). Murray indicated that a “vanguard of psychologists and educators believed that the best math teaching blends both approaches” (1998, p. 2). This means that math education should include ideas of constructivist math, such as allowing students to construct their theories and test them, but math education should also contain basic math facts and computation.

A gathering of some of the nation’s leading math professors in December 2004 resulted in an agreement that the reforms in math education are having positive results (Strauss, 2004). The professors agreed that now students are getting a better understanding of math and not just memorizing the facts. There were several surprise agreements at the meeting in Washington. The professors seemed to be moving toward a “centrist position” on the teaching of mathematics in American schools. There were three major agreements and they are as follows:

- (1) Heavy reliance on calculators in the early elementary grades is a bad idea.
- (2) Elementary school children must have automatic recall of number facts, meaning that, yes; they have to memorize multiplication tables.
- (3) Children must master basic algorithms. The meeting participants spent time defining the word ‘algorithm,’ which means a set of rules for solving a problem in a finite number of steps.

### *Math Teachers*

It is not only important to look at how math is taught, but also by who is teaching it. Almost all elementary school children and the majority of students in grades 7-12 do not have teachers that have a background in the teaching of mathematics. "A 1999 study conducted by the Council of Chief State School Officers revealed nearly 30% of middle and high school math teachers in the United States neither majored nor minored in the subject they teach" (Lawrenz, 2006, p.1). In 2004, Schmid agreed that whatever program a school chooses is not what makes students successful in mathematics. How well the teachers understand math and how much they have been taught about the program their school is using is what will make the students successful (Strauss, 2004). In addition to the teacher's knowledge of mathematics, years of teaching experience, professional learning and education and, as previously stated, licensure are all factors that greatly affect student achievement (Park, 2005).

Qualified math teachers are difficult to find. Sloan (1997) has found that math anxiety is not only prevalent in students; it has also proven to be wide-spread among existing and pre-service elementary teachers. However teachers and pre-service teachers that have had exposure to math methods courses have a significant decrease in anxiety. When Wisconsin math teachers were surveyed in 2006, "time for teachers to share ideas about what works" was the highest ranked item when asked what they feel they need to implement standards-based mathematics curriculum pre-kindergarten through – 12<sup>th</sup> grade (Lawrenz, Bullit Bequette, & Dupuis, 2006). Other highlights from the surveyed Wisconsin math teachers include their desire to have more time to plan collaboratively, more time to observe in colleagues' classrooms, and an increase in

professional development led by people that are successfully implementing standards-based teaching and learning mathematics.

Another aspect of what makes a successful math teacher is how he or she feels about themselves and the subject that they teach. The teacher's ability also affects how the students learn and feel about math. Sloan (1997) found the following:

Pupils of a high achieving teacher demonstrated the highest degree of mathematical achievement, but these pupils exhibited the least favorable attitudes toward mathematics. In contrast, the pupils of middle and low achieving teachers had the most favorable attitudes toward math, yet maintained lower achievement scores. The study also revealed that teachers with positive attitudes had higher achieving pupils (p. 7).

Perhaps one reason why most students do not have a qualified math teacher is because teaching math is not an easy job. A study in New Zealand has shown that there is a great difference in ability and understanding of mathematical concepts at the preschool and beginning levels (Peters, 1998). Clearly, preschool math is different from courses like high school calculus, for example. By the time a student reaches secondary education, the students that are at a higher level in mathematics would be in a different course than the students that are requiring remedial or more basic mathematical courses. The large gap in ability at the preschool level would obviously make teaching mathematics at this level very challenging. Therefore we have some students that are starting off behind, and this same study shows that those students will most likely stay behind for the rest of their academic lives. This means the achievement gap between these students will continue to widen as they progress through school. Math is a cumulative study and when one topic is missed it snowballs into several topics quite rapidly. Unfortunately, this trend is even more prominent in females.

Even though it is challenging to teach mathematics and perhaps even more so to hire quality math teachers, it is crucial to reiterate that the most significant factor for students' engagement and achievement is the teacher (Park, 2005). According to Park, student engagement is the most important factor in determining how well a student learns. This is because when students are not engaged they are more likely to be disruptive, skip classes, or simply not do any of the work required of the class.

### *Math Attitudes and Anxiety*

In addition to school districts struggling to hire qualified math teachers, they are struggling with the misconceptions associated with mathematics. Most kids do not like math, are anxious when doing math, and many even mirror their parents' negative feelings toward the subject area. In fact, "most middle school students (84%) would rather clean their rooms, eat their vegetables, take out the garbage and go to the dentist than sit down with their math homework" (Math, 2005, p.1). Even "well-educated adults joke about never having been good at math when estimating a restaurant tip but would never brag that they couldn't read" (Rothstein, 2000).

An obstacle that math teachers, parents, and students need to overcome is math anxiety. Sloan (1997) stated that math anxiety occurs most often in those that find their math skills to be inadequate in comparison to their abilities in other subjects. Mathematics anxiety does not appear to have a single cause. It is the result of different factors such as an inability to handle frustration, excessive school absences, poor self concept, parental and teacher attitudes toward mathematics, and emphasis on learning mathematics through drill without understanding. (Godbey, 1997, p. 4)

It can be difficult to determine who has math anxiety and who is progressing, but maybe just at a slower pace. Teachers and parents can look for several symptoms to help determine if a student is struggling with math anxiety. A student may complain of nausea, a hot tingling feeling, extreme nervousness or anxiety, zoning out consistently, becoming easily upset by noises, having the inability to concentrate, negative self-talk, stomachache, and sweaty palms (Godbey, 1997). Sloan (1997) has found that females were generally more anxious than males and students with low achievement scores indicated higher levels of math anxiety.

Teachers can help students with math anxiety by using teaching strategies aimed at promoting self-confidence and a feeling of competency. When math anxiety levels are decreased then student achievement will increase (Sloan, 1997). One way that a teacher may decrease anxiety is through the use of journals. By having students write about what they are doing in math, teachers can assess student understanding and provide encouragement without putting the student on the spot. Another effective method is to use collaborative learning groups, in which students of varying abilities work together to understand math and solve problems. It is crucial for teachers to try to limit math anxiety, because students that performed without math anxiety consistently outperformed their anxious classmates on tests.

### *The Parental Influence*

A parent's attitude about mathematics can greatly affect their child. Godbey (1997) pointed out that many parents buy into the myth that mathematical ability is inborn or hereditary, and that is also a contributing factor to math anxiety. Students will become active members of the math community if their parents are active (in a positive, encouraging, manner) in their education. However there are parents reluctant to assist their children with math for several reasons. For one, they feel inadequate with their own math skills and therefore feel they could



not help others. Another reason is that math is not taught how it was when they were in school. Still others have accepted their own theory that because they were not successful with math that certainly anyone with the same genes could not be good at math either. Teachers need to assure parents that their child can do the math that is being taught and that teachers and parents can work together to make it happen. "It has been suggested that even mathematically unsophisticated parents can become the natural partners of teachers if they are given the materials to use and the guidelines for using them effectively" (Peters, 1998, p. 2). A great example of this is at Spooner, Wisconsin's Family Math Day. As participating families leave, they get a packet full of the activities that they have just completed so that the families can recreate the fun at home.

Many school districts and teachers are reaching out to create and expose children to positive math related experiences to create a positive attitude about math in our schools. For example when Spooner hosts Family Math Day they create opportunities to get students working with family members on hands-on math games and activities. The day was organized by the Action Team, which is a group of community and staff members that plan extracurricular, academic events for the school district. The group also made sure that all the participants received prizes and packets with the directions for the activities. Another example is at Everett Area Junior-Senior high School in Pennsylvania, students get excited about math with a Math Career Day that features Miss Pennsylvania teaching math concepts to the middle school students. They also select other speakers that have careers that use mathematics to listen to and learn from throughout the day. The participating students spend time talking about practical math applications, listening to guest speakers from over 40 different occupations, and playing

math games. Both the Family Math Day and Math Career Day are untraditional ways that schools can give students positive experiences that center on math.

Another event that involved students using their math skills in an interesting way was the Math Fair in the Park Falls, WI School District. In 2007 Park Falls Elementary School had its inaugural Math Fair, in which sixth grade students created and hosted booths that featured math games. Kindergarten through fifth grade came and participated in the event. The day ended with a lottery in which students had a chance to win prizes.

There is potential for math activities outside the regular classroom at the Park Falls School District. The District currently has a lighthouse program. Farmer-Hinton (2002), describes a lighthouse program as one that is school-based and is after school. It is primarily used for remediation. At this time, the Park Falls lighthouse program strays from Dr. Farmer-Hinton's definition, because it is used mainly to allow community members to use the school's facilities. For example there is currently supervision and instruction that takes place in the gymnasiums, the swimming pool, the wood shop, and the computer labs. Therefore, due to the lack of remediation for students, the Park Falls lighthouse program does not really fit into the description by Farmer-Hinton (2002).

This is, however, a great opportunity to use the school's facilities and staff members to create a math remediation addition to the lighthouse program. The revised lighthouse program would still offer the current amenities, but it would also include opportunities for the students of the district. Studies have shown the more time that a student invests in a particular subject the more likely they are to outperform peers that spend less time. Unfortunately, in the United States, students typically spend less time on actual instruction than students in other countries do (Farmer-Hinton, 2002). The updated lighthouse program will increase the time students spend

on math and, therefore, start to close the achievement gap between American students and those of higher achieving countries.

The Park Falls School District would make the updates to their lighthouse program according to what research has proven to be most effective. A lighthouse program that coordinates the academic activities of a regular-day school and an after-school program are most effective. The program will require quality staff (i.e. teachers) to run the program. Dr. Farmer-Hinton also suggested that providing recreational time and nutritional meals will increase family and community involvement (2002). At this point, the lighthouse program is already providing recreational time, so this should be a smooth transition.

### *Academically Speaking*

It is understandable how the typical American math student can feel that math is boring and that they cannot do it. Math is often taught the same way everyday. Many classrooms showcase a stale, redundant math routine. Teachers need the opportunity to learn how to teach with manipulatives and games, how to create and assess meaningful projects, and how to teach with a combination of rote computational activities and constructivist methods. Teachers also need opportunities to create authentic instructional work, because, according to Park, it leads to engagement in elementary, middle, and high school students (2005). It has already been noted that engagement leads to achievement.

The fact is evident that change is crucial. We are in the midst of math wars and debates on how to solve the problems with math education. Today, teachers are searching for ways to make math “real” and applicable to their students. They are doing so without a national curriculum. Murray pointed out that in America, we lack a comprehensive math curriculum like China has and that is one main reason why we are constantly lagging behind other countries.

(1998). Currently, the best guide for educators is the NCTM's Focal Points, which give scope and sequence of what should be mastered at each grade level.

All of the previously mentioned struggles are occurring in the community in which I teach. In the Park Falls School District we do not have 100% of our students to the proficient level in math on the state tests. We are doing as Cross says and looking at the state test as a tool for determining where we are now in terms of mastery and where we need to improve (2004). We know that we need to make some changes to assist our constantly changing and increasingly diverse student population. Our administration and Math Improvement Committee agree with Cavanagh that students who take the most math will get the best jobs and be the most successful (2007).

### Chapter III: Project Goals and Objectives

This project is the first of many initiatives by the Park Falls School District to reflect on our current situation, make a plan for improvement, and then lay the groundwork to accomplish those goals. The district is currently struggling in the area of mathematics in the way our students perform on state tests and the performance of our students in the classroom. Therefore, the district is looking for ways to improve how mathematics is taught in the district and to improve those that teach mathematics. It is the hope that through the acquisition of in-service opportunities, professional development, and resources such as manipulatives and books we will progress to the levels expected by No Child Left Behind in 2014.

In accordance with the No Child Left Behind law all students must be at the “advanced” or “proficient” levels on Wisconsin state tests. In order to understand the Wisconsin Knowledge and Concept Exam (WKCE), it is important to understand what each scoring descriptor means. An “advanced” score demonstrates in-depth understanding of academic knowledge and skills tested on WKCE. “Proficient” demonstrates competency in the academic knowledge and skills tested on WKCE. A “basic” score means the student demonstrates some academic knowledge and skills tested on WKCE. The “minimal performance” descriptor means the student demonstrates very limited academic knowledge and skills tested on WKCE. Each descriptor is awarded based on the number of points earned by the student and varies by grade level and subject tested.

#### *Students Will have an Increased Ability in Mathematics*

One way that the teachers will gauge students’ understanding of math concepts as they are taught is through the use of a math journal. All teachers in our school district will be required to have all math students write in the math journal a minimum of three times in a five day week.

For example a first grade student may get a simple prompt like, “What I learned today was...” While a third or fourth grade student could have a prompt like, “The method I used to solve this problem was...” A higher level student may write in their math journal things that they need to remember in order to be successful when solving a certain type of problem or areas that are confusing to them.

Another method that will show that students are using higher level thinking skills is the requirement that all students will complete one authentic project that incorporates at least three math standards each year. An authentic project will demonstrate knowledge that is applied in a real-world style application. For example, projects that deal with consumer math, budgeting, and architecture would fall into this category.

*Students will have increased state test scores.* The students in the Park Falls School District will improve their scores on the WKCE to see all regular education children at the advanced or proficient level by 2014. For example an eighth grade student would be expected to score above 513 points to be in the “proficient” or “advanced” level. As was mentioned previously, the number of points varies for each grade level and subject area. Another way to improve test scores is to improve students’ knowledge of mathematical concepts that correlate with their grade level. A set of guidelines created by the National Council of Teachers of Mathematics, called the Focal Points, outlines exactly what should be mastered at the end of each grade level. When the students are more confident in their knowledge of mathematical concepts, they will be able to apply their knowledge in written form as done in the WKCE. This will ensure measurable improvements will be shown in state testing scores.

*Teacher improvement.* Teachers will be in-serviced to teach mathematics with the best practices and with the most beneficial teaching materials. Teachers will be given opportunities to

participate in workshops and in-services presented by more experienced staff members or experts, like college professors. Teachers will also have access to school's supplies of math manipulatives and software. Manipulatives are simply items that can be manipulated to "act out" a problem. Some examples are pattern blocks, unifix cubes, fraction strips, and geoboards to name a few. Each teacher will be provided an updated list each school year of what is available and how to get it.

*Math across the curriculum.* Teachers in our district will be required to implement integration of math into all subject areas. They will need to show proof of this by submitting a lesson plan, with a student sample, and a reflection of the activity to the Math Improvement Committee twice each school year. Teachers in all content areas will incorporate math into something that they already do to in their existing curriculum to expose the students to as much math as possible. This will show students how their math skills are used in other places than the math classroom.

*Teachers collaborate.* Teachers in the Park Falls School District will be given release time to collaborate on math lessons and practices. This is a crucial goal of the project, because students move from teacher to teacher each year and some type of uniformity on how math is taught will help students transition more easily. This objective is also one that the staff in the Park Falls School District feels is absolutely necessary so the teachers can share their ideas with each other.

## Chapter IV Project Methodology

The teaching of mathematics is currently in a critical phase. Teachers are unsure of how to teach math to the students of today, and parents are reluctant to see math taught in way that differs from how they were taught. This grant will allow for the teachers of the Park Falls School District to break new ground regarding improvements in the teaching of mathematics. The Park Falls School District is committed to making math matter to our students and their parents. A timeline of how we will accomplish our goals this school year has already been determined (see Appendix F).

### *Action Plan and Timeline*

The Math Improvement Committee will oversee all of the activities planned in this timeline. We have been given complete administrative support from our principal Mr. Mike Plemon and our superintendent Dr. Mike Walschlager.

There are several activities that have been planned to enhance student learning, improve teaching, and gather and interpret data regarding mathematics in the Park Falls School District. Several initiatives will occur throughout the school year. For example, a member of the Math Improvement Committee will present at each school board meeting to keep the school board and community members of what we are doing to improve math education for students of Park Falls. Also, our administration has agreed to communicate with the local newspaper about progress that we are making when he gives his monthly school report. Students and parents will also be informed just by walking through the lobby of our school where math projects will be displayed. This will also give the students a sense of pride in their accomplishments.

The beginning of the school year will feature events to get the staff informed about the expectations the district has of them and where they need to go throughout the school year. In



September, teachers will administer surveys to students about their feelings about math. Also in September, the Math Improvement Committee will update and distribute manipulative lists to the staff. We have been doing this for a few years so that teachers are not purchasing things that are already in the building for their use and to make teachers aware of what is available.

In addition to September's events, October will feature guest speakers in the fifth and sixth grade, and also the first math in-service of the school year. On every Friday in October, a professional person who uses math in his/her career will come in and speak to the students in the upper elementary grades about the importance of math in their jobs and lives. Later in the month there will be a half-day in-service during which the staff will spend time to work on creating math lesson plans that meet on or more of the standards.

The rest of the first semester will be spent taking the WKCE and monthly meetings of the Math Improvement Committee. The Committee will discuss what has been accomplished at this point and set goal for the second semester. They will also determine what will be the focus of the January in-service and also begin to organize Family Math Night, which will be in the first week of February.

In the second semester the Math Improvement Committee will begin to wrap things up for this school year, plan a few end of the year events, and set goals for the summer and start of the 2008-09 school year. The first week of May features the Green Lake Math Conference in Green Lake, Wisconsin. The attendees will be expected to share what they learned during a meeting in June. During the last week of school the sixth grade will host the Math Fair for kindergarten through fifth grade in the high school gymnasium. For two weeks in the summer, a minimum of two teachers will participate in the Wisconsin Academy Staff Development

Imitative (WASDI). During these workshops, retired math professors engage the teachers in math activities and teach methods that they can pass onto their colleagues.

At the end of the 12 months, many activities will have been created and experienced and several hours of productive discussion will have been had. The ultimate goal is to improve the staff and engage the students. When this goal is accomplished, we are confident that we will see an improvement in test scores.

#### *Evaluation Plan and Tools*

The evaluation plan will consist of reviewing state testing scores, analyzing data from the student surveys (Appendix C), analyzing the teacher surveys (Appendix D), and feedback forms from parents that they filled out after Family Math Night (Appendix E). All of the surveys are in the appendixes. The Math Improvement Committee will distribute and collect these surveys. Results will be discussed in Math Improvement Committee meetings as shown in the timeline (Appendix F).

#### *Dissemination Plan*

According to the administration in the Park Falls School District, math instruction is of high interest to several of the rural schools in northern Wisconsin. Many schools are struggling with scores on the standardized tests and with making sure that students are gaining knowledge that they can apply to their lives. The progress and achievements of this program will be highlighted throughout several media venues, such as the school website and local newspapers. Each month *The Park Falls Herald* features academic events that occur in the Park Falls School District, and the math activities that our students and staff participate in will be highlighted in this location. The district also does a radio show each month that often features academic initiatives taken on by the school and its staff. It is also intended that as the staff learns new

techniques individuals will present their knowledge at Cooperative Educational Services Agency (CESA) workshops and staff in-services of many area schools. Several elementary and middle school teachers from our district are willing to present our “Making Math Matter” project at the Green Lake Conference, which is the largest math conference sponsored by the Wisconsin Math Council. The Math Improvement Committee also hopes to distribute copies of our Math Across the Curriculum packets to other schools.

### *Budget*

The funds that will be granted to the Park Falls School District will primarily allow us to host activities to make memorable math experiences for our students. Some funds will be used to allow staff members to attend conferences or expand on their professional development. The funds will not be used for travel expense, but only for registration fees. Teachers will also be compensated for their time with data analysis during the summer months.

The Park Falls School District will also use some of their funds to assist the project. During summer school, the students use the SuccessMaker computer program. The program features activities that are tailored to the level of the student. The use of this program requires an annual maintenance fee of \$1,400 that the school pays. The district also pays for lodging and mileage when a staff member attends a conference or workshop. Finally, the district allows for the math department to purchase anywhere from \$1,000 - \$2,000 worth of manipulatives and resources each year depending on the flexibility of the budget.

The grant provided by the Plum Creek Timber Foundation and the aid of the Park Falls School District will allow for the students of the Park Falls School District to grow in their knowledge of mathematics. The increased knowledge is the first of many dominos that will fall into place to ensure that the students of the Park Falls School District have a bright future.

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## Appendix A: Cover Letter



December 5, 2007

Plum Creek Foundation  
999 Third Ave., Suite 4300  
Seattle, WA 98104

Dear Plum Creek Foundation Board Members:

The Math Improvement Committee at Park Falls Elementary School is pleased to submit a proposal to the Plum Creek Foundation. Our committee has made a pledge to the students, parents, teachers, and community of Park Falls to ignite a passion for mathematics in our students. We feel that we will be able to reach our goal through in-service activities.

The Park Falls School District is like many rural districts in northwestern Wisconsin in that it is financially struggling. The district has already made the commitment to reallocate funds to the mathematics programs in order to reach our new, more diverse, student population.

The committee has had dialogue with several professors of mathematics at accredited universities in the area. We are looking to begin a series of in-service opportunities with them for our entire staff (not just the teachers of mathematics). Our hope is that math skills will be essential to every course our school offers. Our teachers have expressed the desire to make math a priority in order to raise our WKCE (Wisconsin's standardized tests) scores and build a mathematical foundation that will serve our students throughout their lives.

Park Falls Elementary School has 288 students in grades Pre-K through five. In 2006 grade three had 65% of the students at the "Advanced" or "Proficient" levels on the WKCE. We are struggling with the rest of the nation's schools to get our students to 100%. The statistics of grades K-2 show a declining trend in our math scores. We aspire to change our future!

Thank you for considering Park Falls Elementary School as a worthy recipient of an in-service training grant supported by the Plum Creek Foundation. Please contact Math Improvement Committee chairman, Elizabeth Trochil at (715) 762-5669 or by email [btrochil@cardinalcountry.net](mailto:btrochil@cardinalcountry.net). I look forward to hearing from you!

Sincerely,

Elizabeth Trochil  
Math Improvement Committee  
Park Falls School District



## Appendix B: Grant Foundation Proposal Request



**P**lum **C**reek **F**oundation

**G**rant **A**pplication

*The mission of the Plum Creek Foundation is to provide philanthropic contributions to community organizations to support and improve the general welfare and quality of life in the communities that Plum Creek serves.*

# GRANT APPLICATION

## INFORMATION

Organization Name: <b>Park Falls School District</b>			
Organization Name as shown on 501(c)(3) letter <b>School District of Park Falls</b>			
Address <b>380 N 9<sup>th</sup> Ave.</b>	City <b>Park Falls</b>	State <b>WI</b>	ZIP Code <b>54552</b>
Contact Person's Name <b>Elizabeth Trochil</b>	Phone Number <b>(715) 762-5669</b>	Title <b>teacher and head of Math Improvement Committee</b>	
Contact Email <b><a href="mailto:btrochil@cardinalcountry.net">btrochil@cardinalcountry.net</a></b>			
Organization Mission <b>The tenet of the Math Improvement Committee is that through in-service and professional development opportunities the staff in the Park Falls School District will ignite a passion for mathematics in our students</b>			
Website: <b><a href="http://www.cardinalcountry.net">www.cardinalcountry.net</a></b>			

## PROJECT INFORMATION

Project Title <b>Math Improvement Project</b>	
Geographic Area to be served <b>Northern, rural Wisconsin</b>	
Client Group to be served <b>Students of the Park Falls School District</b>	Size of Group <b>Approximately 800 students</b>
Anticipated Project Period <b>2007-2008 school year and summer of 2008</b>	
Total Project Cost <b>\$6,600</b>	Amount Requested from Plum Creek (Maximum- \$10,000) <b>\$6,600</b>
Type of Request: <input type="checkbox"/> Capital Support <input type="checkbox"/> Operating Support <input type="checkbox"/> Special Project	

## OTHER FUNDING

Other Funding Sources (attach list if necessary) <b>The Park Falls School District - will pay for other miscellaneous costs associated with this project</b>	
Amount and source of pledges/commitments to date: <b>We do not have any specific monetary donations at this time other than the support of the Park Falls School District. They will contribute what they can when needed.</b>	Other funding sources applied to for this project: <b>I applied to the NCTM for any funding available.</b>
Does your organization receive support of any type from United Way? <input type="checkbox"/> NO <input type="checkbox"/> YES (if yes, please describe)	
Has your organization ever received funding from Plum Creek? <input type="checkbox"/> NO <input type="checkbox"/> YES (if yes, please describe. Include attachments if necessary)	
Signature	Date

**(1) Project Description - Please describe the project in detail.**

The Math Improvement Committee is striving to acquire funds for professional development. The National Assessment of Educational Progress (NAEP) states the importance of staffing schools with well-trained math teachers. Research shows that nearly 30% of math teachers in the United States neither majored nor minored in the subject they teach. Regardless of the efforts of the highly dedicated staff in the Park Falls School District, approximately one-fourth of our students are not making it to a "proficient" level in mathematics. Data shows that our district will continue to have declining scores on the math portion of our state's standardized test. Our school district is making the math education of our students a priority by allocating the equivalent of four full days of release time and resources, which include professional development opportunities, substitute teachers, and money to obtain the latest technology and manipulatives. The funding that we receive will be used to invest in sessions with an expert in math education. The Math Improvement Committee wants to ensure that all of our students have a deep, meaningful understanding of mathematics, and we will do this by improving our instruction.

**(2) Need – What are the problems that this project will address?**

The Park Falls School district has a significant population of students from low income families. In fact, nearly 30% of our students are taking free and reduced lunch, and this does not count the number of students that qualify and choose not to take it. The Daytona Daily News states, "The test score connection with income is more than twice as strong as with other state report card factors like race, teacher pay, teacher education or school district spending" ("Income, test scores strongly linked in Ohio schools," 2006). The Math Improvement Committee wants to overcome this hurdle by finding ways to make math meaningful to students at their own level. The goal is not only for the standardized test scores to improve so our school does not lose funding, but we are even more concerned with preparing our students for lives that they dream about having. The fact that education is the key to success is a motto that is constantly reinforced in our school. Help us step up to the challenge of empowering intelligent, hard-working kids.

**(3) Time Line** – Please explain the steps you will take to implement this project and the dates on which you expect to accomplish each step

Sept. 2007	Oct. 2007		Nov./Dec. 2007	Feb. 2008
Administer student survey of math abilities Update and distribute math manipulative lists to staff.	<i>Math In-Service time</i> Teachers will spend time planning how they will use math in their lessons and especially use lessons that emphasize the Focal Points for their grade level.		WKCE testing <i>Math Committee meetings</i> Discuss WKCE testing and assess what we have accomplished and what we will cover in January in-service	All non-math teachers must have handed in a math lesson they taught with a written reflection.
Mar. 2008	May 2008	June 2008	July 2008	Aug. 2008
Administer same student survey of math abilities from Sept.	Green Lake Math Convention. A minimum of four members of the committee will attend.	<i>Math In-Service time</i> Attendees of the Green Lake Convention will share what they learned with the staff.	<i>Math Committee meeting</i> Compare student surveys and review WKCE test scores for data analysis	Members from the Math Committee will attend WASDI, a statewide project to provide staff development in mathematics Summer school session will use the SuccessMaker program to work on math.
<p>Year long activities:</p> <p>Each month updates from Math Improvement Committee will be presented to the school board and therefore put into their minutes. Highlights of the school board meetings are also often in the local newspaper.</p> <p>Outstanding math projects will be featured in the local newspaper and displayed in the school lobby.</p> <p>Teachers will be using new math lessons from the sessions at the May 2006 Green Lake Conference as a supplement to current curriculum.</p> <p>There will be a minimum of 4 sessions with Carolyn Hopp. The dates will not be set until we meet acquire the grant and look at her schedule.</p>				

**(4) Support** – What kind of support exists for this project? (Please be as specific as possible, include names of community groups, etc.)

This proposal supports the Park Falls School District Vision Statement, Wisconsin state standards, and math standards identified by the NCTM (National Council of Teachers of Mathematics). The Park Falls District pledges to "provide structured, ongoing staff development time and training based on the identification of those skills and strategies instructors must have in order to teach students what they need to know to succeed not only in school but also in life" (2006). The superintendent of the Park Falls School District has provided me an hour a day to research ways to improve our math program and look for financial support to supplement the support our district is able to provide.

**(5) Future Support – How will this project be financed in the future?**

The Park Falls School District mission statements says, "The district provides structured, ongoing staff development time and training based on the identification of those skills and strategies instructors must have in order to teach students what they need to know to succeed not only in school but also in life." Our administration truly believes that teachers need to grow professionally to be what our students need. Therefore, the Park Falls School District will continue to provide funds to the development of its staff. Unfortunately the amount of money available is decreasing rapidly due to limited state and federal funds. The hope is that through professional development we will eventually be able to support itself. The professional development will enable teachers to collaborate with each other in order for all of the staff to have the best practices in the teaching of mathematics. The Park Falls School District will continue to support in-service times and the acquisition of manipulatives or other instructional aids. Armed with these tools we will be self reliant.

**(6) Our Funds – Specifically, how will Plum Creek's grant be used?**

The Plum Creek grant will allow a minimum of 4 teachers from our school district to participate in the Green Lake Math Conference sponsored by the Wisconsin Math Council. The grant will pay the registration fee for the instructors, will pay for transportation and lodging, and will pay for substitute teachers. Additional money would used for the purchasing of manipulatives and software from the WMC Exhibit Hall. In addition, we will use the Plum Creek grant to invest in professional development sessions from, Dr. Carolyn Hopp, a retired Math Education Instructor from the University of WI in Eau Claire.

The district data and resources will assist in clarifying our vision for school mathematics, the needs of our most critical students, and the corresponding needs of the professionals who work in our district. As the plan unfolds, our math education specialist will work with us on everything from content development to in-service implementation. Throughout the course we will receive course evaluation and analysis as well as ongoing recommendations for modifying our professional development plan to build district capacity and increase student learning.

**(7) Relevance to Plum Creek – Why should Plum Creek Foundation support this project?**

Plum Creek is a model of how to responsibly and ethically run a company in today's society. In same way that Plum Creek is a model to other businesses, the Park Falls School District has the desire to be model in how to improve how mathematics is taught in public schools. We have a staff that is willing to put in the extra time, an administration willing to give extra money, and students ready for the work that lies ahead. We will start with one school and eventually assist an entire area of rural schools take their math programs to "proficient" and beyond.

This project is the first of many initiatives by the Park Falls School District to reflect on our current situation, make a plan for improvement, and then lay the groundwork to accomplish those goals. We currently are struggling in the area of mathematics. The in-service opportunities are the first component to accomplishing the goals the Math Committee has set for the district. Ultimately we aspire to graduate students with a deep, meaningful understanding and appreciation of mathematics. In the future, we want more students to temporarily leave our community to get post-secondary education to amplify their current math knowledge, and then come back as highly educated, productive citizens.

## Appendix C: Student Survey

Circle the number that indicates your feelings on the following items.  
1 = strongly disagree 5 = strongly agree

I know that I am a good math student.	1 2 3 4 5
I know my multiplication facts.	1 2 3 4 5
I am good at problem solving.	1 2 3 4 5
I like doing projects in math, because they show how I will use math in the "real world."	1 2 3 4 5
I like math.	1 2 3 4 5
I think it is important to understand math.	1 2 3 4 5
Math is easier for me when I get use manipulatives (objects to act out the problems).	1 2 3 4 5
I work really hard to do well in math.	1 2 3 4 5

Write what a teacher can do to help you understand math.

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## Appendix D: Teacher Survey

Circle the number that indicates your feelings on the following items.

1 = strongly disagree 5= strongly agree

I found the directions that were given to me about the one required lesson in a non-math subject area were complete and easy to understand.	1 2 3 4 5
I found that it was NOT difficult to create a lesson that included math in another subject area.	1 2 3 4 5
I believe that the math committee was available for me if I had questions or concerns.	1 2 3 4 5
I believe that including math across the curriculum helped our students.	1 2 3 4 5
I found that it was NOT difficult to increase my daily math to 45 minutes or more.	1 2 3 4 5
The copy of the Pre-K through 8 Focal Points was helpful.	1 2 3 4 5
The list of the manipulatives for my use was helpful.	1 2 3 4 5
I have made a conscious effort to improve the way that I teach math in the past year.	1 2 3 4 5

Please write in any suggestions or additional comments that you have.

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## Appendix E: Family Math Night Survey

Circle the number that indicates your feelings on the following items.

1 = strongly disagree 5= strongly agree

I found the sign-up process for my family to be convenient.	1 2 3 4 5
I found that Family Math Night was at a good time and an appropriate location. If you have a suggestion for another time or place please write that here:	1 2 3 4 5
I believe that the volunteers and the Math Improvement Committee were available when I had questions.	1 2 3 4 5
I believe the activities were fun.	1 2 3 4 5
I believe the activities were educational and appropriate for my child.	1 2 3 4 5
I enjoyed the refreshments and the atmosphere.	1 2 3 4 5
I think the Math Improvement Committee should host Family Math Night again next year.	1 2 3 4 5
Something that I liked about Family Math night was:	
This is what I would like to see done differently next year:	

Please write in any suggestions or additional comments that you have.

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## Appendix F: Math Improvement Committee Timeline

Sept. 2007	Oct. 2007	Nov./Dec. 2007	Jan. 2008	Feb. 2008
<p>Administer student survey of math abilities (found in evaluation plan and tools section of grant proposal).</p> <p>Update and distribute math manipulative lists to staff.</p>	<p><i>Math In-Service time</i> Teachers will spend time collaboratively planning how they will use math in their lessons and especially use lessons that emphasize the Focal Points for their grade level.</p> <p>Each Friday of the month 5<sup>th</sup> and 6<sup>th</sup> graders will have a professional speak to them on how they use math in their job.</p>	<p>WKCE testing</p> <p><i>Math Committee meetings</i> Discuss WKCE testing and assess what we have accomplished and what we will cover in January in-service</p>	<p><i>Math In-Service time</i> Topic TBA Get an expert to in-service staff.</p> <p>Math Committee will organize activities and volunteers for Family Math Night.</p>	<p>All non-math teachers must have handed in a math lesson they taught with a written reflection.</p> <p>Family Math Night in Elementary School.</p>
Mar./April 2008	May 2008	June 2008	July 2008	Aug. 2008
<p>Administer same student survey of math abilities from Sept.</p> <p>Mrs. Trochil will start preparing activities for the Math Fair that the 6<sup>th</sup> grade will host during the last week of school.</p>	<p>Green Lake Math Convention. Three members of the committee will attend</p>	<p>6<sup>th</sup> grade will host the Math Fair from 12:00-3:00 in high school gym.</p> <p><i>Math In-Service time</i> Attendees of the Green Lake Convention will share what they learned with the staff.</p>	<p><i>Math Committee meeting</i> Compare student surveys and review WKCE test scores for data analysis</p>	<p>Members from the Math Committee will attend WASDI a statewide project to provide staff development in mathematics Summer school session will use the SuccessMaker program to work on math.</p>

**Year long activities:**

Each month updates from Math Improvement Committee will be presented to the school board and therefore put into their minutes. Highlights of the school board meetings are also often in the local newspaper. Outstanding math projects will be featured in the local newspaper and displayed in the school lobby.