Hands-On Activities to be Implemented Within a Title I/LAP Math Program

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HANDS-ON ACTIVITIES TO BE IMPLEMENTED WITHIN A TITLE I/LAP MATH PROGRAM

Project Report
Presented to
The Graduate Faculty
Central Washington University

In Partial Fulfillment
Of the Requirements for the Degree
Master of Education
Master Teacher

By
Margaret Rae Hancock
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ABSTRACT

HANDS-ON ACTIVITIES TO BE IMPLEMENTED WITHIN A TITLE I/LAP MATH PROGRAM

By

Margaret Rae Hancock

The project provides middle school math teachers who work with the lower quartile of the student population at the middle school level, a handbook of strategies, methods and activity ideas to implement into the classroom to enhance student learning. The handbook allows middle school math teachers the opportunity to explore alternative teaching practices. It contains student-centered activities, which will allow the lower quartile of the student population an opportunity to have a positive experience in math, as well as taking ownership of their learning. By connecting the students prior knowledge to situations in math that the students can make a relationship with will produce an understanding of various mathematical concepts that were once meaningless to the students. This handbook provides student-centered mathematical activities that implement the use of various manipulatives such as, visual, kinesthetic, computer technology and real life mathematical situations that will allow the students to relate their own experiences as well as explore and build on new mathematical reasoning and concepts.
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CHAPTER I
BACKGROUND OF THE PROJECT

Introduction

As defined by the Office of Superintendent of Public Instruction for Washington State Title, I/LAP is the name of the program authorized under the Improving America’s Schools Act, from Congress. The purpose for this program “is to enable schools to provide opportunities for children served to acquire the knowledge and skills contained in the state’s challenging content and student performance standards that all children are expected to meet” (Bergeson, 2004, p.1). Bergeson (2004) suggested the following fundamental strategies that address the needs of the children served by Title I/LAP:

1. A schoolwide focus on improving teaching and learning (p.1).

2. Flexibility at the local level in tandem with clear accountability for results (p.1).

3. More focused targeting of resources on the neediest schools (p.1).

4. Strong partnerships between schools and communities to support the achievement of children served (p.1).

5. Addressing the developmental and cognitive needs of qualifying young children by partnerships or direct services (p.1).

However, this program does not have an appropriate adopted curriculum for these learners therefore, the program must utilize the math curriculum adopted by the school district, which consists only of textbook math. Students who are served by this program obviously do not make connections to the math concepts presented by the curriculum used as a primary learning tool. Based on the researcher’s observation these particular learners have difficulty relating to math concepts presented in the curriculum without
using other alternatives, such as hands-on activities with the use of various manipulative tools.

This particular Eastern Washington School District requires each student to be assessed in mathematics using a computer based assessment tool, which is called the North West Educational Assessment (NWEA). The assessment is a computer-based tool, which allows the students to receive a cumulative score based on their performance. This score is then entered into a management system, which allows the scores of each student to be recorded in ascending order at the school in which they attend. At the researchers’ site twenty-five percent of those students who are not at grade level according to the NWEA score are given the opportunity to be provided Title I/LAP mathematics service.

There are various factors that may contribute to each individual student’s unsuccessful experience in math. Some of these factors may include learning disabilities, anxiety, English as second language, motivation, family structure and attitude or math “worth.” It is possible the students may have an inability to make any connections or relationship to mathematical concepts without having an education experience in which they may be familiar with.

Title I/LAP math program offers the lower twenty-five percent of each grade level to be served in a smaller classroom size with teacher and para professional assistance. This is an opportunity to build on any of the student’s prior knowledge and basic math skills by creating student-centered activities that will enhance and engage student accountability in their learning.
Because these students have obviously not had effective mathematical instruction in which they can understand, connect to or explain mathematical concepts, the researcher has come to the conclusion that it is necessary to use hands-on activities, which will support and align with the Eastern Washington School District adopted math curriculum. In addition, the activities in this project will also support and align with the Connected Math curriculum currently available at the researchers' site. The Connected Math allows students to "develop mathematical knowledge, understanding, and skill, as well as awareness and appreciation of the rich connections among mathematical strands and between mathematics and other disciplines" (Lappan, Fey, Fitzgerald, Friel, and Phillips, 2002, p.1). This will provide students who have diverse learning styles with alternative avenues, which will allow students an opportunity to have a meaningful, positive and successful educational experience in math.

Purpose of the Project

The purpose of the project is to provide middle school math teachers, who teach the lower quartile of the student population, an opportunity to investigate and support mathematical applications with the use of hands-on math activities. These activities will provide a student-centered learning environment, as well as group discussions, which will enhance students' performance and understanding of mathematical concepts and will promote a learning community to evolve in the classroom. It has been suggested that "discussion with fellow-students can be an important contribution to learning" (Skemp, 1987, p. 88). Implementing group discussion into the classroom will stimulate new ideas "simply by the pooling of new ideas" (Skemp, 1987, p. 89), which allow others to have them available to build on.
The project will also provide a variety of hands-on math activities, which will allow the students an opportunity to experience visual, kinesthetic and computer technology to enhance student performance and understanding of math concepts presented in the math curriculum. Real-life situations presented in the activities will also enhance the student’s ability to formulate their own ideas, investigate situations, and apply problem-solving skills to achieve success. The activities will also allow the students an opportunity to communicate their thinking both to the teacher and their peers.

Significance of the Project

The lower quartile of the student population who are struggling or below grade level in math are those who were basically taught by the traditional text-book, pencil and paper method.

Providing mathematical material which is useful to the students, builds a relationship between math concepts and the use of mathematics in everyday life. National Research Council (1989) has suggested that “the ideas of mathematics influence the way we live and the way we work on many different levels” (p. 32). They are as follows:

Practical – knowledge that can be put to immediate use in improving basic living standards. The ability to compare loans, to calculate risks, to figure unit prices, to understand scale drawings, and to appreciate the effects of various rates of inflation brings immediate real benefit. This kind of basic applied mathematics is one objective of universal elementary education (p. 32).

Civic – concepts that enhance understanding of public policy issues. Major public debates on nuclear deterrence, tax rates, and public health frequently center
on scientific issues expressed in numeric terms. Inferences drawn from data about crime, projections concerning population growth and interactions among factors affecting interest rates involve issues with essentially mathematical content. A public afraid or unable to reason with figures is unable to discriminate between rational and reckless claims in public policy. Ideally, secondary school mathematics should help create the “enlightened citizenry” that Thomas Jefferson called the only proper foundation for democracy (p.32).

Professional – skill and power necessary to use mathematics as a tool. Science and industry depend increasingly on mathematics as a language of communication and as a methodology of investigation, in applications ranging from theoretical physics to business management. The principal goal of most college mathematics courses is to provide students with the mathematical prerequisites for their future careers (p. 32).

Leisure – disposition to enjoy mathematical and logical challenges. The popularity of games of strategy, puzzles, lotteries, and sport wagers reveals a deep vein of amateur mathematics lying just beneath the public’s surface indifference. Although few seem eager to admit it, for a lot of people mathematics is really fun (p. 33).

Cultural – the role of mathematics as a major intellectual tradition, as a subject appreciated as much for its beauty as for its power. The enduring qualities of such abstract concepts as symmetry, proof, and change have been developed through 3,000 years of intellectual effort. They can be understood best as part of the legacy of human culture which we must pass on to future generations. Indeed,
it is only when mathematics is viewed as part of the human quest that lay persons can appreciate the esoteric research of twentieth-century mathematics. Like language, religion, and music, mathematics is a universal part of human culture (p. 33).

Limitations of the Project

The limitations of this project are as follows:

1. This project contains math activities used for the lower quartile of middle school student population.

2. This project contains student centered, hands-on activities that may not be appropriate for higher level students.

3. This project contains hands-on activities that align with an Eastern Washington School District adopted math curriculum, which may not be available in other classrooms.

4. This project is integrated into a Federal funded program, which may allow title educators more funds than that of a regular classroom.

Definitions of Terms

**Connected Math** - Research based curriculum that helps students develop sound mathematical habits.

**Manipulative** - Materials that are physically handled by students in order to help them see actual examples of concepts being discovered.

**Title I/LAP** - A program assisting the lower twenty-five percent of the student population, which do not meet grade level expectations.

**LAP** - Learning Assistance Program
Compass - Computer math program integrated with the Eastern Washington School District adopted math curriculum.

Kinesthetic – Physical touch, feel and movement experience.

Math Alive - Visual math curriculum, which provides visual manipulative use.

NWEA - North West Educational computer based Assessment tool.

Project Overview

Chapter one provides the purpose and significance, as well as the limitations and definitions of the project. Chapter two includes literature reviews and research summaries, which directly support and those that do not support the use of various activities, which integrate manipulative use, such as visual and kinesthetic material, as well as computer technology in the remedial math classroom. Chapter three explains the project procedure, development and implementation of the various strategies, methods and the use of numerous manipulatives in a remedial math class.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

Chapter two looks at the objectives, goals and potential benefits of implementing hands-on activities, which will allow students to receive additional experience in math concepts presented. The information gathered provides a solid foundation in which math activities aligned with a math curriculum can be implemented. The purpose is to provide possible hands-on activities, which educators could integrate into their curriculum for remedial learners. By implementing hands-on activities, in addition to the curriculum, will allow the students to explore real life experiences and have control over their own learning with the use of various manipulative tools, such as visual and kinesthetic material, as well as computer technology. The following statement made by John Dewey reflects a philosophy on the importance of educators providing activities that will assure students educational experiences. “The educator is responsible for a knowledge of individuals and for a knowledge of subject-matter that will enable activities to be selected which lend themselves to social organization, an organization in which all individuals have an opportunity to contribute something, and the activities in which all participate are the chief carrier of control”(Dewey, 1938, p. 56).

A curriculum described by Dewey is “child-centered, based on social needs, and the experiences of children. It promotes democratic values. It encourages students to be independent, cooperative, and creative because its methods and objectives are of the present time”(Clarke, 2003, p. 241). Dewey (1938) also believed that using authoritarian style of teaching practice could “hinder the development of individuality, external
discipline, and learning both from books and teachers or by experience. Students are more likely to acquire specific skills when the study involves attaining skills that have some direct relationship to real life in a changing world” (Clarke, 2003, p. 241).

Background

Clarke (2003) described the history of goals in mathematics, which described how “society changed and became more complex and sophisticated over the centuries, so too did the goals of mathematics” (Clarke, 2003, p. 241). However, the goals of mathematics “have not always been consistent with social goals, nor have they kept pace accordingly” (Clarke, 2003, p. 241).

“Shortly after NCTM’s “Agenda for the 80’s” was distributed, the publication, A Nation at Risk (1983), sounded a clarion call for increased attention to improving educational outcomes in the United States” (Huetinck and Munshin, 2000, p. 8). The publication suggested that the “greatest threat to our society was not from outside our boundaries. Instead, the threat posed by huge numbers of young people deficient in the educational tools needed to work and function in our society boded for economic disaster. Improving educational outcomes for all students became the rallying cry for the next wave of reform. Thus, the mathematics reforms beginning in the 1980’s were a response to poor achievement in mathematics by far too many students” (Huetinck and Munshin, 2000, p. 8).

Huetinck and Munshin (2000) also mentioned that data of various United States mathematics classrooms is collected every ten years by the Second International
Mathematics Study (SIMS). According to Mcknight (as cited in Huetinck & Munshin) *The Underachieving Curriculum* (1987), which summarized the SIMS regarding instruction noted the following:

1. “Mathematics instruction in the United States is clearly textbook-driven” (p. 10).
2. “At the eighth-grade level, instruction appeared to be dominated by abstract and symbolic representations of content” (p. 11).
3. “The single strategy most frequently emphasized by teachers was presenting and demonstrating procedures or stating definitions and properties – what has been characterized as ‘tell and show’ approaches” (p. 11).

“Mathematics is the key to opportunity” (*Everybody Counts*, 1989, p. 1).

Mathematics language and concept knowledge contribute to create a healthy economy. Workers who are willing and prepared to “absorb new ideas, to adapt to change, to cope with ambiguity, to perceive patterns, and to solve unconventional problems” (*Everybody Counts*, 1989, p. 1) are ready for today’s job market.

The need for student achievement and accountability in mathematics has been an increasing concern with educators as well as employers. Several approaches using various strategies and methods in curriculum could be used to remedy the problem of low student performance. Every student must receive mathematics instruction to be a productive citizen. To become employed in today’s work force, Caine and Caine suggested (as cited in Midkiff & Thomasson, 1993) employee’s must be “problem solvers, decision makers, adept negotiators, and thinkers who are at home with
openendedness, flexibility, and resourcefulness" (Midkiff & Thomasson, 1993, p. 5).

Challenges to Hands-on Math Activities

The researcher experienced factors that could inhibit the use of hands-on math activities with the use of manipulative tools. One of the factors is the issue of time the educator will need to spend learning the appropriate modeling style to teach with the manipulative tools to assure student understanding and achievement. A quantitative study was conducted measuring the use of manipulative devices in kindergarten through sixth grade classrooms. A discussion with the teachers involved in this study suggested “eighty percent of the teachers reported they consider teacher competency of teaching mathematics using manipulatives as a factor. Teacher competency and transfer of learning from the concrete to abstract level were ranked second in terms of most important factor to consider when using manipulatives” (Hatfield, 1994, p.5). Another factor is the availability of funding for the variety of manipulative tools that may be required to use during the activities such as computer technology, calculators, and graphing tools.

A qualitative study on teacher beliefs about the use of technology in the classroom concluded that teachers are “making a conscious decision not to use technology” (Bolyard, 2001, p.5). Two major aspects were addressed such as, “time spent creating and tweaking activities due to lack of adequate training and time spent during instruction to complete the technology activity” (Bolyard, 2001, p.5). These findings support the belief of how it is an important factor to not only model but also, how to properly model mathematical concepts with the use of manipulative tools. “Modeling makes concepts in math and science more concrete by giving the students
something to see, examine, and experiment with” (Hands-On Learning, 1999, p.1). Finally, the dynamics, socioeconomic levels, and cultural diversities may also pose a struggle towards implementing hands-on activities with the use of various manipulative tools. It has been suggested that the “teaching of mathematics should relate both to a child’s immediate experience of his or her everyday social and physical environment and to the wider society of which he or she is a part” (Nelson, Joseph & Williams, 1993, p.7). The educator may find it difficult to provide appropriate hands-on activities in multiculturally diverse classrooms, which contain significant minority groups, due to the cultural and societal differences.

Although research has suggested the use of hands-on manipulative tools and activities may enhance student learning there have been studies that suggest differently (Dorward, 2002). A study was conducted using three experienced sixth grade math teachers. This activity compared the use of virtual manipulatives, physical manipulatives or no manipulatives. Over a five week period in geometry the results suggest that while “a substantial increase was found in student achievement as measured by the pretest and posttest result on spatial visualization and reasoning abilities there was no statistically significant difference in achievement gains found between students who used the virtual manipulatives and those who used either the physical counterpart or no manipulatives” (Dorward, 2002, p.2).

**Rationale for Supporting Hands-on Math Activities**

The following statement by Burz and Marshal (1996) explains a variety of key factors that may influence learning and need to be recognized as we move in to the twenty-first century:
There is consensus among the experts about the necessity for all students to have strong mathematical ability. With this thought in mind, it is imperative that our educational environments provide all students with the opportunities to do worthwhile and purposeful mathematical work. Recognizing and engaging key factors that influence learning – like challenge, motivation, and relevance – it is necessary to provide instructional environments where practices and curricula reflect an integrated approach to problem solving. In such an environment, students must be actively involved in exploration, investigation, and experimentation with models, concrete materials, and everyday objects in order to develop conceptual understanding of mathematical ideas. The future demands that students be involved today in applying higher-order thinking skills to problem-solving situations they can relate to their own experiences and connect directly to real-life examples (p. 11).

Midkiff and Thomasson (1993) have implied that the implementation of computers, calculators and manipulative use within the instruction, student-centered learning and mathematics based on real life experiences as well as problem solving skills will engage students in actively participation in mathematics. “Motivating students to learn and making learning meaningful are two factors that are the key to any child’s success in mathematics”(Midkiff and Thomasson, 1993, p. 6).

National Council (1989) has suggested even though there is a growing concern to make mathematics meaningful, “some teachers are still functioning in the dark ages in terms of teaching the learning process” (Midkiff and Thomasson, 1993, p. 6). Many teachers depend on and teach from textbook-based materials such as
worksheets and/or workbooks. These are not motivational tools to the students nor do they help promote a connection to real life experiences students could relate to.

“Teachers must capitalize on students’ experience in order for students to be able to form patterns and relationships that are essential for a good foundation in mathematics” (Midkiff and Thomasson, 1993, p. 7).

With the different learning styles of each student, research has suggested that teachers must incorporate “meaningful, challenging and relevant learning in the classroom” (Midkiff and Thomasson, 1993, p. 7). Research has also suggested that mathematical content and skills instruction can be taught by diversifying strategies and methods of instruction. According to Carson and Bostick (1988) and Jarolimeck (1990) (as cited in Midkiff and Thomasson, 1993) this will allow students to develop as “self confident problem solvers, form appropriate conceptual schemes, and engage in instruction based on diagnosed learning styles and needs” (Midkiff and Thomasson, 1993, p. 8).

Students learn to solve “arithmetic problems by a variety of means – just as adults do in ordinary activities. Sometimes, one calculates mentally (figuring tips); other times, one estimates (buying groceries). Still other times, one calculates with pencil (doing carpentry) or with a calculator (preparing taxes). Learning basic arithmetic requires that one learn all these approaches – not only how to do them, but, more importantly, when to do them” (Everybody Counts, 1989, p. 48).

“Effective teachers are those who can stimulate students to learn mathematics” (Everybody Counts, 1989, p. 58). Providing mathematical activities which include a variety of strategies and methods will allow students to “examine, represent, transform,
solve, apply, prove, and communicate" (Everybody Counts, 1989, p. 59), as well as the opportunity for the students to take responsibility of their own learning.

Ortan and Wain (1994) also support and mention the importance of mathematics in the world and society. The authors mentioned that the “indisputable fact is that mathematics is vital to the maintenance of satisfactory living standards. It is mathematics, which underpins the science and technology that support modern society. It would seem to be legitimate aim for educators to wish that pupils will come to an understanding of how society works, and this implies an understanding of how mathematics provides support” (Ortan and Wain, 1994, p. 14).

Summary

The prior study’s and literature mentioned above help support the implementation of hands-on math activities with the use of manipulative tools. Allowing students to build on prior knowledge and apply differentiated strategies and methods with the use of a variety of activities and manipulative tools in mathematics will enhance real-life problem solving skills. It has been suggested that educators feel that students learn through making sense of the world themselves. Never the less, discovering, exploring and experiencing through interaction with mathematical concepts and manipulative tools will allow a student an opportunity to experience an appropriate environment that will enhance their relationship with mathematics (Ortan, 1987).

Students at the middle school level are in “transition, both mentally and physically” (Dolan, 1993, p. 58). Educators need to adequately supply alternative means, which will “allow them to continue developing their reasoning skills and move from the concrete to the abstract ideas of mathematics. Instruction should be designed so as to
keep the doors “open” for all. Too often, students at this level turn away from mathematics, which may hinder their ability to pursue further learning or the career of their choice” (Dolan, 1993, p. 58).
CHAPTER III

Genesis of Project

The researcher became interested in this project during the second year of teaching Title I/LAP math. During the first year of teaching Title I/LAP math the researcher attended several training sessions and conferences which concentrated on providing various methods and strategies of implementing hands-on math activities with the use of manipulatives as part of classroom curriculum. The researcher recognized the positive benefits of implementing hands-on math activities with the use of manipulative tools such as computer technology, calculators, and physical objects with the particular group of middle school math students being served through the Title I/LAP math.

The researcher noticed the positive benefits after implementing activities with the use of a variety of manipulative tools use in particular content areas. Some of these benefits included student participation, communication, and learner responsibility. The researcher also recognized the opportunity to implement math activities aligned with the adopted curriculum currently being implemented at the middle school level. The math activities being implemented with the use of various strategies, methods and manipulative use in teaching mathematical concepts allowed students to explore, discover, communicate and experience a positive educational experience. Student connection to real life situations provided the students a successful opportunity to apply math concepts to prior knowledge.

Connecting mathematical concepts to prior knowledge is difficult for students if the concepts have or had little meaning. The researcher recognized the possibility of student growth and the opportunity for the students to build on prior knowledge by
providing activities along with the curriculum that allows the students to create and make connections to real life situations.

Project Development

To improve mathematical understanding and educational teaching practices that engage student-centered learning, Tomlinson (2001) made the following suggestions that will help struggling students develop confidence as learners. They are as follows:

1. Be sure assignments and/or supporting activities require them to apply and extend essential understandings and skills for the unit or other product span (p.90).

2. Use formats that allow students to express themselves in ways other than written language alone (p.90).

3. Give assignments and/or supporting activities in smaller increments, allowing students to complete one portion of a product before introducing another (p.91).

4. Think about putting directions on audio or video tape so students can revisit explanations as needed (p.91).

5. Support students in finding appropriate resources by setting up interview, bookmarking Internet sites and readable sources on related topics (p.91).

6. Work with students to target portions of rubrics that reflect their individual needs (p.91).

7. When students do not have resources and support for product completion outside of school, provide time, materials, and partnership at school (p.91).
Title I/LAP students need to realize that mathematical concepts are used in every day life. Jackson and Davis (2000) suggested the "teachers should differentiate instruction so that, over time, all students are given access to different avenues for learning and have opportunities to learn that best suit them in relation to critical knowledge and skills. Teachers need to be sensitive to students who have skill gaps, realizing that they may need to pay more attention to these students and be sensitive to how well such students grasp the underlying purpose of each lesson and activity" (Jackson and Davis, 2000, p.78). Therefore, students have an opportunity to recognize and understand the importance of mathematical concepts in relation to their real life situations; they can modify their attitude and behavior toward math. Hands-on math activities will allow students to make connections and also provide an alternative avenue to explore and communicate their understanding of concepts, which will lead to a successful and positive educational experience in math.

Irvin (1997) mentioned "in contrast to traditional pedagogy in which only the teacher supervises and instructs, cooperative learning involves a shifting of authority from the teacher to the students, who become largely responsible for their teammates' effort and understanding during team study periods. The methods are responsive to the needs of middle school students, as they allow for peer interaction and offer opportunities for self-direction and autonomy" (Irvin, 1997, p.245). Therefore, mathematics teachers need to encourage students to be actively engaged, as well as taking responsibility and control over their own learning. Activities should encourage students to actively participate in cooperative groups, which allows students to share their approach in solving problems. Heuser (2000) summarized how allowing students the opportunity to
make choices during an activity will enhance motivation because it is of interest to the student. He also mentioned time with manipulatives is helpful to develop abstract concepts in a variety of situations that may directly relate to the student’s prior experiences. The last component mentioned was allowing students an opportunity to reflect on their activity. This will allow students to organize the acquired knowledge and make connections to concepts learned in the past. Aichele (1978) mentioned “Children learn about concepts through interacting with the environment and with other people” (Aichele, 1978, p.30). Engaging students in challenging activities of interest allows abstract concepts to be explored in activities involving real life situations.

The project provides teachers alternative activities, which will provide student-centered learning. The information and activity units in this project allow teachers an opportunity to step away from the traditional teaching method of paper, pencil and textbook. The author has collected a wealth of information that will benefit student’s mathematical education. The information provided in this project was gathered from a variety of resources including Connected Math curriculum, textbooks, literature and activities provided by attending training sessions, conferences, research and colleagues. The project provides teachers five activities that align with the Washington State Grade Level Expectations as well as the adopted math curriculum at the researchers Eastern Washington middle school. These hands-on math activities provide student-centered learning by implementing a variety of methods, strategies and the use of manipulative tools, which are aligned with the adopted curriculum.
Project Implementation

The researcher has incorporated a variety of activities for the middle school mathematics teacher. The student-centered activities provide an opportunity for struggling middle school students to have a successful experience in math. The researcher encourages teachers to incorporate the activities and assessment tools to provide struggling middle school math students alternative educational experiences that build and reflect on prior knowledge and will assist in future mathematical experiences.
CHAPTER IV
THE PROJECT

Introduction

This project will be used to implement hands-on activities with the use of a variety of manipulative tools into a mathematical curriculum. It was written for Title I/LAP math teachers who serve remedial math students, specifically for those who are in a sixth through eighth grade classroom. However, the hands-on math activities presented will be made available to all math teachers who are interested in implementing hands-on activities with the use of manipulative tools to enhance students learning within their math curriculum.

The Project

The five hands-on math activities and ideas will allow students to make connections with mathematical concepts to real-life situations and/or problems. These mathematical activities will enhance student’s ability to formulate their own ideas, investigate situations and apply problem-solving skills to achieve success.

These hands-on activities include manipulative tools such as visual, kinesthetic and computer technology, which will increase student motivation, participation, performance and understanding of the mathematical concepts presented. The concepts presented in the activities represent real-life situations, which include investigating factors, statistical data, graphing data, and gaining knowledge about how math concepts are used in actual everyday life. In addition each hands-on math activity includes the Primary Goal of activity, Washington State Grade Level Expectations, Pre-Assessment,
Key Concepts, Essential Questions, Skills and Methodologies, Content and Resources, Instructional Activities, and Individual Assessments and Rubric suggestions.

The hands-on math activities presented are modified specifically for Title I/LAP students at an Eastern Washington Middle School, however teachers are encouraged to revise and modify the activities to benefit the student’s ability level, as well as to assure student-centered learning.

The hands-on math activities will allow students not only to make connections, but also provide an alternative avenue to explore and communicate their understanding of mathematical concepts. Student achievement and accountability in mathematics have been an increasing concern to both educators and employers. Therefore, differentiated curriculum, strategies and methods implemented into a mathematical curriculum and classroom would allow students an opportunity to take ownership of their learning as well as to become productive citizens in society.

The three hands-on math activities support the mathematical concepts studied at the middle school level as well as reviewing basic concepts such as multiplication, division, addition, subtraction, and place value that Title I/ LAP math students often struggle with. The activities are modified to provide an appropriate student-centered learning environment for Title I/LAP math students. In addition, the hands-on math activities and ideas provided are only suggestions to implement into a mathematical curriculum, which attempts to meet the ability level of each student.

Student Expectations

Middle school Title I/LAP math students often have had an unsuccessful experience in their math education. To assure success the students must be allowed to
take ownership of their learning and feel their input in the classroom is validated. The Title I/LAP math students will be expected to meet the guidelines specified in the each activity, such as the Essential Questions, Instructional Activities as well as to demonstrate their understanding through the suggested form of assessment. Modifications should be specified by the individual teacher, specifically in the Title I/LAP math program to reassure student success.

Teacher Expectations

As previously mentioned, student achievement in mathematics is of great concern to both educator and employer. Therefore, providing hands-on activities using a variety of strategies and methods with the use of manipulative tools will provide a positive student-centered learning environment. Each Title I/LAP math teacher is required to follow his/her own learning requirements. Implementing these hands-on math activities into a Title I/LAP math program the teacher will be expected to perform the ongoing task of providing a safe and comfortable learning environment, defining unfamiliar vocabulary and concepts, and clearly explaining directions as well as the expectations. In addition, the individual teacher will also modify each activity to meet the needs for individual learners, consistently monitor student participation and understanding of mathematical concepts introduced, and properly present or model the manipulative tools to ensure student success. The activities are aligned with the current Washington State Grade Level Expectations and have been modified to provide an appropriate learning environment for Title I/ LAP math students. Each student will be required to meet the Assessment suggestions for each activity with appropriate modifications made by the individual teacher. This will allow all learners the opportunity for success in math.
Summary

As a result of this project, middle school Title I/LAP math teachers will have hands-on math activities with the use of manipulative tools such as kinesthetic, visual and computer technology to implement into a Title I/LAP math program.

As stated in Chapter one, these activities will provide a student-centered learning environment, as well as group discussion, which will enhance student’s performance and understanding of mathematical concepts and will promote a learning community to evolve in the classroom.

The project includes a bibliography of resources used to implement the hands-on activities. It also includes research articles and literature that support the idea of implementing hands-on activities with the use of manipulative tools into math classrooms to ensure an appropriate learning environment for struggling math students.
CHAPTER V
CONCLUSION

Summary

The purpose of this project is to implement hands-on activities with the use of manipulative tools into a Title I/LAP math program. Currently the Title I/LAP math program has not adopted a math curriculum appropriate to those students who qualify for Title I/LAP math services.

This project can be implemented into any math classroom, but is intended for those students who qualify for Title I/LAP math service. The hands-on activities can be utilized in other math classrooms by appropriately modifying the criteria of each activity to ensure a positive learning experience and allow for student success.

The topics presented in the project explain the importance of implementing hands-on math activities with the use of manipulative tools into the math classroom and providing student-centered learning. The project also discusses the need for adequate and appropriate math education for students who are struggling in mathematics allowing them alternative avenues to explore mathematical concepts and making real-life connections. It is an educator’s responsibility to provide appropriate math education and to meet the needs of students to ensure they have a strong mathematical foundation, which will allow them the opportunity to become productive citizens.

Conclusion

In conclusion, this project was designed for middle school Title I/LAP math teachers who serve those students struggling in math. Although the three hands-on activities provided in this project align with the curriculum presently used at the Eastern
Washington Middle School as well as with the Washington State Grade Level Expectations, the activities can be implemented by any math classroom teacher interested in the benefits of hands-on learning and manipulative use. The hands-on activities coincide with the mathematical concepts usually covered at the middle school level as well as reviewing basic math concepts that Title I/LAP math students often struggle to master, such as multiplication, division, adding, and subtracting.

Students who are provided appropriate level hands-on math activities with the use of manipulative tools have an opportunity to explore, investigate, gain knowledge and relate math concepts to real life situations. Furthermore, teachers that implement hands-on math activities allow students an opportunity to communicate their thinking both to the teacher and their peers utilizing a variety of strategies that promote a positive educational experience.

Recommendations

As a result of this project, three hands-on activities with the use of manipulative tools have been prepared specifically for a Title I/LAP math program. However, these activities can be implemented into any math classroom with teacher modifications. It is recommended that teachers who implement these hands-on activities in any classroom modify to meet the student’s ability level.

Another recommendation for the hands-on math activities presented in this project is to visit the school library and utilize available video’s, literature or computer technology if those resources are not available in the classroom.

Hands-on math activities with the use of manipulatives allow students of all ability levels to experience a variety of avenues to problem-solve, communicate, discuss,
explore, and investigate math concepts that were once meaningless. Building a relationship with math concepts by allowing students to make real-life connections and utilizing a variety of strategies gives students a positive, productive educational experience.
REFERENCES


MATH

ACTIVITES BOOKLET

A Guide to Hands-on Math
Activities with the Use of
Manipulatives

Created For
Title I/LAP Math Teachers
INTRODUCTION

Throughout the development of this hands-on math activity booklet, the drew heavily on the following curricula:

- Prime Time Unit – Connected Math Program
- Hands-On Math Projects with Real-Life Applications
- Fraction Management System – Fraction Bar Instruction

The activity ideas were adapted and used during the creation of the activity booklet. New ideas were created and implemented to provide appropriate ability level activities for Title I/LAP math students. This activity booklet is, therefore, a compilation of ideas from the above texts, adapted for use in a middle school Title I/LAP math program.

The hands-on math activity booklet provides middle school Title I/LAP math teachers an activity booklet that includes various strategies, methods and activity ideas to implement into the classroom to enhance student learning. The activity booklet allows middle school Title I/Lap math teachers the opportunity to explore alternative teaching practices that will enhance student success. The hands-on math activities presented are modified specifically for Title I/LAP students at an Eastern Washington middle school and will take an extended amount of time in comparison with students from a regular classroom. However, teachers in regular math classrooms are encouraged to revise and modify the activities to benefit the student’s ability level, as well as to assure student-centered learning.

It contains student-centered activities, which will allow Title I/LAP math students an opportunity to have a positive experience in math, as well as taking ownership of their
learning. The five hands-on math activities and ideas will allow students to make connections with mathematical concepts to real-life situations and/or problems. These mathematical activities will enhance student’s ability to formulate their own ideas, investigate situations, apply problem-solving skills and an opportunity to communicate their thinking both to the teacher and their peers.

These hands-on activities include manipulative tools such as visual, kinesthetic and computer technology, which will increase student motivation, participation, performance and understanding of the mathematical concepts. The concepts presented in the activities represent real-life situations, which include investigating factors, statistical data, graphing data, fractions, decimal place value (money), and gaining knowledge about how math concepts are used in actual everyday life. In addition each hands-on math activity includes the Primary Goal of activity, Washington State Grade Level Expectations, Pre-Assessment, Key Concepts, Essential Questions, Skills and Methodologies, Content and Resources, Instructional Activities, and Individual Assessments and Rubric suggestions.

To improve the Title I/LAP students mathematical understanding as well as educational teaching practices that engage student-centered learning, the author incorporated Tomlinson’s (2001) suggestions that will help struggling students develop confidence as learners. The following suggestions will effectively implement the hands-on math activities provided in the activity booklet:

1. Be sure assignments and/or supporting activities require students to apply and extend essential understandings and skills for the unit or other product span (p.90).
2. Use formats that allow students to express themselves in ways other than written language alone (p.90).

3. Give assignments and/or supporting activities in smaller increments, allowing students to complete one portion of a product before introducing another (p.91).

4. Think about putting directions on audio or video tape so students can revisit explanations as needed (p.91).

5. Support students in finding appropriate resources by setting up interviews, bookmarking Internet sites and readable sources on related topics (p.91).

6. Work with students to target portions of rubrics that reflect their individual needs (p.91).

7. When students do not have resources and support for product completion outside of school, provide time, materials, and partnership at school (p.91).

One of the major failings of the activity booklet is that it does not go into any great detail regarding the mathematical concepts such as factors, statistical data, and graphing data, fractions, decimal and whole number place value incorporated in the activities. It is recommended to any teacher implementing the activity booklet within the classroom to refer to the text resources the author utilized during the creation of the activity booklet. This will further the knowledge necessary to teach and facilitate the activities to ensure student success in mathematics.
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ACTIVITY I
AN INTERVIEW TO MATH'S PAST

Primary Goal:
Students will view the past through numbers, gaining an appreciation of mathematical concepts that are needed in real life situations. Students will conduct an interview with an older person (preferably relative) and find out what role mathematics played in his or her life.

Grade Level Expectations:
4.1.1.5, 4.1.1.6, 4.2.1.4, 5.2.2.4, 5.3.1.4, 5.3.2.6

Pre-Assessment: Check for prior knowledge by asking the following:
1. What does “economy” or “economics” mean?
2. How has the economy changed over the past?
3. What mathematical concepts and applications are used everyday in the real world?
4. How are mathematical concepts used everyday in the real world?
5. Why are mathematical concepts used everyday in the real world?

Key Concepts: The students will acquire knowledge about the following:
• Change is frequently shown through a comparison of numbers.
• Various mathematical concepts play a major role in the real world situations.
• Value of mathematical knowledge needed in the real world situations.
• Role of mathematics in our society.
• Economical change in our society.
Essential Questions:

Completion of the interview the students will acquire knowledge of the following questions:

1. What mathematical concepts are used in everyday life?
   - Addition, Subtraction, Multiplication, Division, Estimation, Fractions, Percent, Decimal Place Value.

2. How are mathematical concepts applied and used in the real world?

3. Why is acquiring mathematical knowledge a valuable asset?

4. What mathematical role applies to the following and how has it changed from the past?
   - Housing/Rent
   - Gas
   - Vehicles
   - Entertainment
   - Hourly wage in employment
   - Education
   - Clothing
   - Food

Skills and Methodologies:

- Cooperative groups
- Interview techniques
- Research
- Practice the use of mathematical vocabulary
• Written and verbal communication
• Organization

Content and Resources:
• Text - Hands-On Math Projects with Real life Applications
• Internet
• Video – Why Do We Need Math?
• Guest Speaker – provided by Mrs. Hancock
• Mock Interview

Instructional Activities:
• Watch video
• Read and complete interview questions
• Practice interviewing techniques
• Mock interview with classmate
• Interpreting interview answers
• Create an appropriate and organized presentation
  • visuals, poster board, computer programs (word perfect, PowerPoint)

Individual and/or Partner Assessment:
• Student will provide an organized oral presentation explaining their interview conclusions based on essential questions listed above.
• Student will provide hand written or typed answers to interview questions.
• Students will provide the teacher hand written conclusions to the essential questions listed above.
• Student will write a thank you note to the interviewee.

Rubric Suggestions:

• Total point value – 100 points
• 25 points for each assessment requirements

Teacher Suggestions:

This assignment will take approximately two to three weeks with Title I/LAP students depending on which grade level (6-8) it is assigned. Teachers should allow additional class time for Title I/LAP students to receive teacher assistance.
INTERVIEW TIPS

You can learn much valuable information about a topic during an interview. Listed below are some suggestions that may help you get the most out of any interview.

• Think about who is best able to give you the information you are looking for.
• Learn as much about the subject in advance as you can. This will help you to formulate questions that will provide you with useful information.
• Think of questions before the interview. Write them down. Use questions that require explanations. Avoid questions that can be answered with simple yes or no.
• Be ready to ask a follow-up question to clarify or expand an answer you receive.
• If you are not sure about an answer, ask for more explanation.
• Consider recording your interview on a tape recorder. Keep in mind that some people do not like to be recorded. Ask first. If they object, don’t use it. If they don’t mind, be sure you have a clean tape and fresh batteries. (Take along a pen and pad just in case.)
• If you are taking notes with a pen and pad, don’t try to write down everything your interviewee says. Focus on the main points. Use your own personal shorthand of abbreviations.
• For important facts or statements, try to write down the person’s exact words. You can quote the person after the interview. Whenever writing a person’s exact words be sure to use quotation marks.
• After you have asked your questions, end the interview by thanking the interviewee for his or her time. Don’t keep the interview running after it is done. End by thanking the person. Writing a thank-you note a few days later is a nice gesture.
Since the focus of your interview will be on mathematics, your questions should zero in on math. Listed below are the questions to be asked and answered as part of the project requirements.

1. What was the pay per hour (or the salary) of your first job?

2. What was your job, and what were your responsibilities?

3. What was the price of a gallon of gasoline?

4. What was the cost of a new car?

5. What was the price of a new house?

6. What was the cost of renting an apartment or house?
7. What were the prices of clothing and shoes?

8. What was the price of groceries? Example bread, milk, eggs, vegetables, fruit and meat.

9. What did people do for entertainment when you were young?

10. How much did that kind of entertainment cost?

11. What was considered a “fun” activity?

12. What kind of math did you learn in school?

13. How much math homework did you receive?

14. What was your math class like?
15. How did you figure out answers to long or difficult problems?

16. Did you ever need to use math on a job? If yes, in what way

17. In what ways have you seen mathematics change during your life?

18. What surprises you about math’s role in society now?
ACTIVITY II
MY SPECIAL NUMBERS PROJECT

Investigation of Factors, Greatest Common Factors, Least Common Factors, Prime Factorization, and Prime or Composite Whole Numbers

Primary Goal:

Students will learn some new and useful strategies for finding factors and multiples of whole numbers. The students will apply these strategies to gain familiarity with prime and composite numbers and to solve real-life problems.

Grade Level Expectations:

1.1.1.3, 1.1.2.3, 1.1.3.5, 1.1.3.6, 1.1.5.3, 1.1.6.4, 1.1.7.4

Pre-Assessment: Check for prior knowledge by asking the following

1. What are factors of at least two whole numbers?
2. What is the greatest common factor of at least two whole numbers?
3. What is the least common factor of at least two whole numbers?
4. What is the prime factorization of at least two whole numbers?
5. Classify a whole number as:
   - Prime or composite
   - Even or odd
   - Abundant
   - Deficient or perfect

Key Concepts: Students will investigate the following

- Relationships among factors, multiples, divisors, and products
- Factors come in pairs
• Recognize numbers as prime or composite and as odd or even based on their factors
• Use factors and multiples to explain some numerical facts of everyday life
• Numbers which are written in exactly one way as a product of primes (Fundamental Theorem of Arithmetic)
• Situations in which problems can be solved by finding factors and multiples

**Essential Questions:**

The following questions will be investigated throughout the “Prime Time” unit:

1. What is a factor of a number?
2. How can factors be found?
3. Do all numbers have factors?
4. How can factor and multiple concepts be shown physically with tiles and rectangles?
5. What does it mean to say that a number is prime?
6. Why must a factor string be unique?
7. How can these ideas relate to the physical world?
8. What are common factors and common multiples?
9. How do these concepts further mathematical understanding?

**Skills and Methodologies:**

• Multiplication and division algorithm
• Cooperative groups
- Venn diagrams
- Effective problem solving
- Reflection of each investigation in journal

Content and Resources:

- Prime Time – Connected Math Curriculum
- Computer

Instructional Activities:

- Investigations provided by “Prime Time”
- Factor game – provided in Investigation 1 of Prime Time
- Supplemental “Math Pizzazz” assignments – provided by Mrs. Hancock
- Computer - Compass math program
- Tiles – model even and odd numbers and rectangles
- Class time to reflect in their “JOURNAL” on individual’s special numbers after each investigation in “Prime Time” (with teacher assistance if needed)
  - Factors of special numbers
  - Even or odd
  - Prime or composite
  - Square number for special numbers
  - Multiples
  - Divisibility
  - Perfect, abundant and deficient
• Prime factorizations (Both)
• Greatest Common Factor (Both)
• Least Common Multiple (Both)
• Mystery clues and solution
• Venn diagram (Both)

**Individual Assessment:**

The student will use their creativity to present their final “My Favorite Numbers” project. The following suggestions have been successful for the students to apply in producing their project:

• Poster Board
• Booklet form
• Using a variety of visuals or pictures from magazines
• Computer programs used to describe information if applicable

**Teacher Suggestions:**

This activity/project will take approximately six to eight weeks with Title I/Lap students. Allow class time to work on activity in accordance to the “Prime Time” investigations. This will allow teacher assistance for Title I/LAP math students.
### My Special Numbers Project

**Evaluation Sheet**

**General Information:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name and block were clearly written on the project</td>
<td>2</td>
</tr>
<tr>
<td>At least two real life connections were clearly shown</td>
<td>3</td>
</tr>
</tbody>
</table>

**Mathematical Information:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The list of <strong>Factors</strong> for special numbers was given</td>
<td>5</td>
</tr>
<tr>
<td><strong>Even</strong> or <strong>Odd</strong> was clearly proven for special numbers</td>
<td>5</td>
</tr>
<tr>
<td><strong>Prime</strong> or <strong>Composite</strong> was clearly proven for special number</td>
<td>5</td>
</tr>
<tr>
<td><strong>Square Number</strong> for special numbers was proven or disproved</td>
<td>5</td>
</tr>
<tr>
<td><strong>Multiples</strong> of special numbers shown – at least first five</td>
<td>5</td>
</tr>
<tr>
<td><strong>Divisibility</strong> of special numbers shown</td>
<td>5</td>
</tr>
<tr>
<td><strong>Perfect; Abundant; Deficient</strong> shown for special number</td>
<td>5</td>
</tr>
<tr>
<td><strong>Prime Factorizations</strong> shown for <strong>Both</strong> special numbers</td>
<td>5</td>
</tr>
<tr>
<td><strong>Greatest Common Factor</strong> for <strong>Both</strong> special numbers</td>
<td>5</td>
</tr>
<tr>
<td><strong>Least Common Multiple</strong> shown for <strong>Both</strong> special numbers</td>
<td>5</td>
</tr>
</tbody>
</table>
MYSTERY CLUES - at least three clues were given for

BOTH special number 10 ___

MYSTERY CLUE SOLUTION were given for BOTH

special numbers 10 ___

VENN DIAGRAM shows factors for BOTH numbers 5 ___

OVERALL PROJECT

“My Special Numbers Project” was neatly done 10 ___

“My Special Numbers Project” was organized and easy to follow 10 ___

POSSIBLE POINTS 100 POINTS Earned ___

NAME_________________________________________

BLOCK________________________________________
ACTIVITY III

THE REAL SPORTS SUPERSTAR

Comparing Statistics of Sports Superstars

**Primary Goal:**

Students will work in cooperative groups researching the careers of athletes and compare their statistics, then determine who is the best. The students will create graphs, charts, or tables to represent their findings, and orally share their results with the class.

**Grade Level Expectations:**

2.1.1.7, 3.1.1.7, 3.2.3.6, 3.3.2.6, 4.1.1.5, 4.2.2.7, 5.1.1.7, 5.1.2.7, 5.2.1.4, 5.3.2.8

**Pre-Assessment:** Check for prior knowledge by asking the following:

1. What does the term “average” mean?
2. How is the term “average” used in sports statistics?
3. How can you display and analyze statistical data in an organized manner?
4. How is statistical data gathered and calculated?

**Key Concepts:** Students review the following:

- Appropriate graphs, charts and tables to display organized statistical data.
- Appropriate research tools to find accurate data.
- Determining results based on statistical data.
- Mathematical concept “average”.

**Essential Questions:**

1. What sport and players did your group research?
2. What makes a “Superstar” in the sport you’ve chosen.
   - List specific criteria or examples

3. How did you decide on the particular graph, chart or table chosen to display the statistical data in an organized manner?

4. What research tool(s) did you utilize to find your data?

5. Based on your comparison and analysis of statistical data, which of the athletes are true “Superstars”?

6. Are there other players in your sport who are not usually thought of as being superstar, but who have better statistics than some superstars?

7. How does the mathematical concept “average” play a role in statistical data?

Skills and Methodologies:

- Problem Solving
- Cooperative groups and team work
- Practice variety of research tools and techniques
- Reflection on statistical data using graphs, charts and or tables
- Record keeping

Content and Resources:

- Text – Hands-on Math Projects with Real-Life Applications
- Internet
- Library
- Video – Why Do We Need Math?
- Coaches of different sports
- Sports Almanacs
- Sports cards; baseball, basketball, football, and hockey
- Sports magazines and newspaper

**Instructional Activities:**

- Watch video
- Guest speakers – Coaches from variety of sports discussing specific criteria in sports statistics
- Record keeping – organizing research data (graph paper)
- Pick 5 to 10 favorite players in sport
- Create and complete appropriate graphs, charts and/or tables on computer or poster-paper comparing players statistics
- Library research trip
- Exploring sports various sport related sites on internet

**Group Assessment:** Students will provide the following:

- Organized record of all information gathered.
- Organized graph, table or chart comparing players statistical data.
- Appropriate oral presentation explaining their data and comparing the players.
- Answer the essential questions listed above in an organized and appropriate manner. Typed would be preferred, but not mandatory.

**Suggested Rubric:**

- Total points possible – 100 points
- 25 points for each assessment request
Teacher Suggestions:

This activity will take approximately three to four weeks with Title I/LAP students. The teacher should allow class time for those students needing extra guidance with the requirements of the activity.
ACTIVITY IV
GROCERY SCAVENGER HUNT

Primary Goal:

Students will critically examine grocery ads in newspapers, flyers as well as the Internet. The students will work in cooperative groups and apply various mathematical skills such as decimal place value, multiplication, division, and fraction concepts.

Grade Level Expectations:

1.1.5.4, 1.1.5.6, 1.4.5.5, 2.2.2.5, 3.2.2.5, 3.2.3.5, 4.2.1.5

Pre-Assessment: Check for prior knowledge by asking the following:

1. What do the following mathematical terms mean?
   - Sum
   - Difference
   - Total
   - Product

2. Give the place value of the “3” in the following numbers?
   - 21.03
   - 53.027
   - 61.390

3. Round the following amounts to the nearest cent?
   - $46.285
   - $22.37
Key Concepts: The students will acquire knowledge about the following:

- Using decimal place value in real life situations
- The role of mathematics in society
- Various mathematical concepts play a major role in the real world
- Value of money in the real world

Essential Questions:

1. What mathematical applications are needed in real life situations?
2. Why is acquiring mathematical knowledge a valuable asset?

Skills and Methodologies:

- Cooperative groups
- Research techniques and tools
- Applying mathematical applications
- Organization
- Written and/or verbal communication

Content and Resources:

- Internet
- Newspaper grocery ads
- Food pyramid – listing food group items

Instructional Activities:

- Class discussion on the value of money
- Read and complete scavenger hunt questionnaire by researching grocery ads in newspapers, flyers and Internet
• Create an appropriate and organized presentation of information found by student research

**Group Assessment:**

- Students will provide an organized oral presentation of his/her own paper with the use of a visual such as poster or booklet discussing that many of the problems require a sequence of calculations.
- Students will show the mathematics required proving the ads they chose satisfy the clues in the scavenger hunt questionnaire.
- Students will discuss the process in which he/she used to gather information needed to complete the scavenger hunt.

**Suggested Rubric:**

- Total point value – 100 points
- 50 points – organized presentation and visual showing required sequence of calculations.
- 25 points – proving the ads satisfy the clues in the scavenger hunt (visual).
- 25 points – Discussion led on what research technique he/she found most useful to complete the scavenger hunt.

**Teacher Suggestion:**

This activity will take approximately two to three weeks with Title I/LAP students. The teacher will need to allow in class time to guide and assist students with the activity requirements.
SCAVANGER HUNT

INSTRUCTIONS:

1. Read the math problem.
2. Find grocer ads you can use to solve the problem.
3. Cut the ads out of the newspaper or print them off the Internet and tape/glue on a poster or paper creating a booklet with the required calculations to prove the ad answers the question.
4. Show work in an organized fashion.
5. Be sure to write neatly and CHECK YOUR WORK!

SCAVANGER HUNT QUESTIONS:

1. Find a dairy product whose price has a nine in the tenths place. How much will three of these items cost?
2. Find a food made of grain that costs more than $.89 but less than $2.89. Is three one of its prime factors?
3. Find the total cost of two pounds of pork and one pound of beef. Convert your answer to a fraction and reduce to simplest terms.
4. Find the cost of one pound of a vegetable and one pound of lean beef whose total sum contains an eight in the hundredths place.
5. Find the price of one food that contains both grain and fruit. Round the price to the nearest dollar.
6. Find the total cost of three items you could use to make dinner for your family. Include one vegetable and one source of protein.
7. Find the mean price per pound of two types of citrus fruit. Round your answer to the nearest dollar.

8. Find the cost of four grain products with a total under ten dollars.

9. Find a food that costs the same backwards as it does forwards. (This is called a palindromic number).

10. Find the total cost of four different products that partially or completely come from plants.

11. Find an item that is sold in multiple pound quantities. Determine the price per pound. Round your answer to the nearest cent.

12. Convert the cost of two pounds of a fruit or vegetable to a fraction. Reduce the fraction to lowest terms.
ACTIVITY V
MORE COOKIES PLEASE

Primary Goal:

Students will work in cooperative groups. Students will understand the practical application of reading, math and writing by applying fraction addition, multiplication and division to complete a task.

Grade Level Expectations:

1.1.1.4, 1.1.5.6, 1.1.6.5, 1.1.7.5, 1.4.5.5, 2.2.1.5, 4.2.1.5

Pre-Assessment: Check for prior knowledge by asking the following:

1. Where how are fractions used in the real world?
2. Have you ever made cookies by reading and following a recipe?
3. What mathematical process would be used to double or triple a recipe?
4. What mathematical process would be used to find out how many cookies each person in the class would receive?

Key Concepts: The student will acquire knowledge about the following:

- The role fractions are used in real life situations.
- Value of mathematical knowledge in everyday life.
- Importance of following directions

Essential Questions:

*If a recipe makes three and a half dozen cookies:

1. How many cookies is this?
2. If there are 21 students in the class and they can eat five cookies each, how many cookies do we need?
3. If one batch makes 42 cookies, how many batches do we need?

Skills and Methodologies:

- Cooperative groups
- Reading and following directions
- Practice fractional application

Content and Resources:

- Parent volunteers – in classroom
- Cookie recipe – chosen by class
- Classroom with oven – life skills classroom
- Cookie contents and utensils
- Calculators

Instructional Activities:

- Teacher will split class into cooperative groups
- Class will decide on a cookie recipe or teacher will provide one recipe for all classes
- Groups will be assigned the following:
  - First group – halves the recipe
  - Second group – doubles the recipe
  - Third group makes the recipe to feed the entire grade level for the school
  - Fourth group will convert the recipe to feed 50
Group Assessment:

- Students will provide an appropriate demonstration using poster paper discussing the mathematical operations used to convert the recipe for his/her specific task.

Teacher Suggestion:

After this activity is completed the students will have the opportunity to make cookies in class using a recipe provided by the teacher. This is a fun reward for the students, however the teacher must divide the recipe to allow students to be an active participant for a specific portion or the recipe such as adding ingredients, stirring, placing cookies on cookie sheet, and timing the cookies in the oven. Teacher should make prior arrangements for the use of an oven at the school. Life skills classroom usually has two or three ovens available.
RESOURCES


