

TEACHER IN EDUCATIONAL
RESEARCH

TIES, 2002

Teachers in Industry for Educational Support

**TEACHER IN EDUCATIONAL RESEARCH
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Philosophy: Math is not a talent . . . It is a skill to be learned. Everyone can learn math! To adequately prepare our students for the twenty-first century, all students must have the opportunity to become mathematically literate. Students must be given the opportunity to become active learners as they apply mathematical concepts to real- life experiences. Technology should play a significant role in exploration and discovery of mathematical concepts; yet it should not hinder students from understanding basic facts.

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RESEARCH AND EDUCATIONAL OUTREACH PROGRAMS CURRICULUM OVERVIEW

Summary

This module is a cross-curriculum unit of mathematics, communication and technological development integrated with basic mathematics skills, problem-solving strategies and techniques. They are the basis for making intelligent decisions and essential for students to succeed in a fast changing technological driven society.

Big Picture

Teacher worked with Air Force Research Lab specialists to investigate “why students should learn basic math functions in the age of technology, and why they should not solely depend on calculators”. They worked as partners to facilitate interaction between the Base (the Wright – Patterson Air Force Base Outreach Office and the local K-12 educational community to encourage both students and teachers in the areas of math, communication, and technological development.

Preparation for Unit

1. Discuss purpose, expectations, and goals of unit.
2. Use appropriate assessment tools to diagnose basic competencies and technological skills.
3. Integrate the module within the regular curriculum lessons.
4. Encourage; motivate students to complete each assignment.
5. Implement a timeline.
6. Formulate or assign partners.
7. Accommodate various learning styles in each lesson.
8. Focus on relating activities to real-life applications.
9. Develop a wealth of materials.
10. Include multi media in each lesson.

Overview

On the following page is a module overview with a brief summary of each Authentic Learning Task (ALT) in this module. This table provides an overview of the tasks in the module sections and shows how the activities in the different teaching areas relate to each other.

**TEACHER IN EDUCATIONAL RESEARCH
CURRICULUM UNIT SUMMARY**

Mathematical Development	Communication Development	Technological Development
ALT 1- Math Teaser- Students use problem solving skills to find answers.	ALT 1- Create Word Problems- Students writes their own word problems and is solved by classmates.	ALT 1- Visit Problem Solving web site- Students use computers to practice, enhance problem solving.
ALT 2- The Number Game- Students gives meaning of some commonly used number phrases.	ALT 2- Math Autobiography- Students will write a personal account of numbers in their lives.	ALT 2-The Games People Play- Students visit web-based math sites to play math games to practice, enhance their math skills.
ALT 3- Number Indicators-Students examine how numbers are used as indicators	ALT 3- Keeping A Math Journal- Students record daily activities using math.	ALT 3- Research Project- Students research how math is used in their future careers.

Transfer Activity 1

The students will interview an English teacher, Computer teacher, an administrator and a secretary to gather information on the disadvantages and drawbacks of relying solely on the computer or Word Processor when typing a report.

Transfer II

Students will listen to guest speakers from various careers such as bankers, accountants, bank tellers, cashiers, engineers, teachers, discuss the importance of calculating without the sole use of a calculator.

Section One: Mathematics Development

ALT One: Solve Math Teasers

SUMMARY

The student will read, analyze, solve, given mathematics problems.

COMPETENCIES

Mathematics computation skills-solving equations, problem-solving strategies, solving multi-step problems, critical thinking, Estimating, predicting, analyzing and interpreting data. Communication skills (oral and written), observational skills.

TIME

One class meeting

MATERIALS

“Math Teaser” Worksheet

INSTRUCTIONS

1. The students will read and analyze problems to be solved.
2. The students will identify and implement strategies to solve given problems.

EVALUATION

1. The teacher will use observation to make sure students are completing the activity.
2. Accuracy of students’ written or oral explanations of how they solved each problem.

CLOSURE

Students will evaluate accuracy of their answers.

Section One: Mathematics Development

ALT TWO: The Number Game

SUMMARY

The student will find the meanings of the “number” phrases.

COMPETENCIES

Communications skills (oral and written), research skills, dictionary skills and skills to use other reference books.

TIME

Two class meetings

MATERIALS

“Number Phrases” Worksheet

INSTRUCTIONS

1. The teacher will distribute worksheet “Number Phrases”.
2. The students will skim list and write meanings of any phrases they know.
3. The students will consult dictionaries, math reference books.
4. Students will ask parents or grandparents if they know the meanings of any of the phrases.
5. Students will complete activity.

EVALUATION

The teacher will check written answers. Each correct answer is worth 2 points.

CLOSURE

Students will correct wrong answers.

Section One: Mathematics Development

ALT THREE: Number Indicators

SUMMARY

The students will examine some of the ways numbers are used as Indicators.

COMPETENCIES

Reference skills using dictionaries and general reference books.

TIME

Approximately three class meetings.

MATERIALS

“Math and Indicators” Worksheet, reference books

INSTRUCTIONS

1. The teacher will assign or allow students to choose a partner.
2. The teacher will explain purpose and procedure for project.
3. The teacher will distribute “Math and Indicators” Worksheets.
4. The teacher will consult with librarian in advance to reserve books those students may use as references.
5. The teacher will plan to spend a class period in the library to assist students to get started on their research.
6. The teacher will provide examples.

EVALUATION

The teacher will use observation and students’ oral feedback as an informal assessment.

CLOSURE

Students will compile a list of other number indicators. They will create a class portfolio or a bulletin board.

Section Two: Communication Development

ALT ONE: “Creating Word Problems”

SUMMARY

The students will create and write 3- 5 math problems involving specific skills to be solved by their peers. The problems will involve one or more of the following skills: math calculations, logic, common sense, critical thinking and problem solving skills.

COMPETENCIES

Math computation skills, problem solving strategies and techniques, specific math skills are dependent upon unit of study.
Communication skills (oral and written)

TIME

One class meeting

MATERIALS

Math books, math class notes, challenge sections of math units

INSTRUCTIONS

1. The students will write down math problems involving given skills.
2. The students will provide a legible written copy.
3. The students will provide an answer key.
4. The students will read their problems to the class.
5. The problems will be answered at random by another student.

EVALUATION

The teacher will use observation, students’ verbal feedback and students’ written answer sheets as an informal assessment.

CLOSURE

Students discuss answers, strategies used to solve the problem.

Section Two: Communication Development

ALT TWO: A Mathematical Autobiography

SUMMARY

Students are to write a mathematical autobiography, a personal account of the importance of numbers in their lives.

COMPETENCIES

Communication skills (oral and written), organizational skills.

TIME

Approximately two class meetings

MATERIALS

“Organizing your Autobiography” information sheet

INSTRUCTIONS

1. The students will list various ways numbers affect their lives.
2. The students will identify the most important way numbers affect their lives.
3. The students will consider the following when writing: special dates, sports, grades, money, height, weight, exercise, nutrition, recreation, vacations, goals, and ambitions.
4. The students will organize their information logically, then use good writing skills to express their ideas.
5. The students will use word processor or computer for writing.
6. The students will revise their final copies.

EVALUATION

The teacher will use observation and the students’ final copies as assessments.

CLOSURE

“A Class Sharing” –students will read their final copies aloud.

Section Two: Communication Development

ALT THREE: Keeping A Math Journal

SUMMARY

The students will use writing as a means to express the ways math is used throughout the entirety of one complete day of their lives.

COMPETENCIES

Communication skills (oral and written)

TIME

One class meeting

MATERIALS

A standard notepad or composition book, writing tool

INSTRUCTIONS

1. The teacher will explain procedure for project.
2. The students will make journal entries throughout the day.
3. The students will observe each daily activity.

EVALUATION

Students written and oral responses.

CLOSURE

The students will compare, discuss their journal entries.

Section Three: Technological Development

ALT ONE: Visit Problem- Solving Website

SUMMARY

The students will use web-based problem solving activities.

COMPETENCIES

Computer skills- Internet Applicator

TIME

Approximately two hour weekly

MATERIALS

Computer- web –based program, Mrs. M's Math Mania.

INSTRUCTIONS

1. The teacher will review procedure for using the Internet.
2. The students will click to go to given informational web-site.
3. The students will practice problem solving on given activities.

EVALUATION

The teacher will use observation as an informal assessment tool.

CLOSURE

The students will discuss with teacher and classmates the problems they had difficulty solving and work at the chalkboard with guidance to find the answers.

Section Three: Technological Development

ALT TWO: The Games People Play

The students will visit web-based math sites to play math games to practice and enhance their math skills.

COMPETENCIES

Computer skills- Internet use

TIME

Two hours weekly

MATERIALS

Computer, web-site addresses

INSTRUCTIONS

1. The students will use Internet Applicator
2. The students will click to go to A + Math to play Matho, a combination of math and bingo.
3. The teacher will check web site to find activities suitable for students.
4. The students can also solve hidden picture problems and play a concentration- style game.

EVALUATION

The teacher will use observation and students' computer responses as assessment tools.

CLOSURE

Students will print and discuss their game results.

Section Three: Technological Development

ALT THREE: Research Activity

SUMMARY

The students will use the Internet to research how math is used in their future career. The students will present their findings in a written report and read it aloud to their class.

COMPETENCIES

Computer skills- Internet and Word Processor Applicators, organizational skills, writing skills

MATERIALS

Computers

INSTRUCTIONS

1. Students will chose a career of interest.
2. Students will use the Internet to locate specific information about their careers such as educational requirements (especially mathematics), how mathematics is used in their careers.
3. Students will use the computer to produce a written copy.

EVALUATION

The teacher will use observation, students' written research and oral reading as assessment tools.

CLOSURE

The students will orally discuss their findings and display their work on bulletin board or develop a class portfolio.

TRANSFER ACTIVITY

SUMMARY

The students will interview an English teacher, Computer teacher, an administrator and a secretary together information on the disadvantages and drawbacks of relying solely on the computer or Word Processor when typing a report or project.

COMPETENCIES

Communication skills (oral and written) computer skills- PowerPoint

TIME

Five Class Meetings (PowerPoint Presentations done on day five).

MATERIALS

Notepad for note taking; note cards for organizing oral presentations, computer

INSTRUCTIONS

1. Teacher will explain the project.
2. Students will write given questions.
3. Teacher will read, edit, and approve questions.
4. Students select individuals to interview.

EVALUATION

The teacher will use students' written questions and interview responses and PowerPoint presentation as assessments.

CLOSURE

The students will make a PowerPoint presentation on their interview findings.

RESOURCES

BOOKS

A Supplemental Mathematics Unit for Career Choices by Mindy Bingham, Jo Willhite and Shirley Myers.

Arithmetricks 50 Easy Ways to Add, Subtract, Multiply, and Divide Without a Calculator by Edward H. Julius.

Hands- On Math Projects with Real –Life Applications by Gary Robert Mushchla, Judith A Muschla.

Highlights for Children, July, 2002

Lifestyle Math Your Financial Planning Portfolio A Supplemental Mathematics Unit for Career Choices by Mindy Bingham, Jo Willhite and Shirley Myers.

WEBSITES

<http://s12a.math.aca.mmu.ac.uk/Student> Calculators- A Help or a Hindrance?

www.geocities.com. Calculators in the Classroom

[http. //math.forum.org/mathed/norway.ti92.html](http://math.forum.org/mathed/norway.ti92.html). The TI-92 Symbolic Calculator in Norwegian Mathematics Education.

http://www.education-world.com/a_lesson/lesson061.shtml