

13-201  
LNUCC: App-4/15/14  
Senate: Info-4/29/14

### Undergraduate Distance Education Review Form

(Required for all courses taught by distance education for more than one-third of teaching contact hours.)

#### Existing and Special Topics Course

**Course:** MATH 459 Technology in Elementary/Middle Level Mathematics Instruction

**Instructor(s) of Record:** Dr. Brian Sharp

**Phone:** 724.357.2600 **Email:** bds@iup.edu

#### **Step Two: Departmental/Dean Approval**

Recommendation:  Positive (The objectives of this course can be met via distance education)  
 Negative

[Signature] 3/31/14  
Signature of Department Designee Date

Endorsed: [Signature] 4/1/14  
Signature of College Dean Date

Forward form and supporting materials to Liberal Studies Office for consideration by the University-wide Undergraduate Curriculum Committee. Dual-level courses also require review by the University-wide Graduate Committee for graduate-level section.

#### **Step Three: University-wide Undergraduate Curriculum Committee Approval**

Recommendation:  Positive (The objectives of this course can be met via distance education)  
 Negative

[Signature] 4/15/14  
Signature of Committee Co-Chair Date

Forward form and supporting materials to the Provost within 30 calendar days after received by committee.

#### **Step Four: Provost Approval**

Approved as distance education course  Rejected as distance education course

[Signature] 4/21/14  
Signature of Provost Date

Forward form and supporting materials to Associate Provost.

Received  
APR 11 2014  
Received  
APR 2 2014

**Undergraduate Distance Education Proposal**  
**For**  
**MATH 459**

Instructor: Brian Sharp  
Phone: (724) 357-2600

Office: 216 Stright Hall, Department of Mathematics  
Email: [bds@iup.edu](mailto:bds@iup.edu)

**Step One Questions**

- 1. How is/are the instructor(s) qualified in the distance education delivery method as well as the discipline?**

I have been a member of the Mathematics Department faculty since the 2004-2005 school year. During that time I have taught several sections of MATH 459/ELMA559 which has enabled me to become very familiar with the content. Since 2007, I have taught an online section of MATH 105 using D2L and Coursecompass.com. I use D2L to supplement my instruction in all courses that I teach, onsite and online.

- 2. How will each objective in the course be met using distance education technologies?**

This course teaches students to use technology to enhance mathematics instruction. Part of the course is designed to teach students how to use technologies such as graphing calculators, spreadsheets, interactive whiteboards, and web resources. For the "button pushing" aspect of the course, I have developed step-by-step videos that detail how to use the respective technologies. These videos were made using the recording capabilities of the Smart Notebook software and are easily uploaded to D2L.

Another part of the course consists of discussions on the appropriate uses of technology and social/safety issues related to technology. As a basis for the discussions, students are provided with readings. In the "discussion forums" of D2L, I will post topics related to the readings. Students will respond to the questions and comment on each other's responses.

The official syllabus of record for MATH 459 lists six broad objectives for the course: Students will:

- employ various forms of educational technology for teaching mathematics. Students will learn to use various technologies by watching step-by-step videos. After they view the videos, students will be given assignments to practice using the technologies. For example, students will watch videos on how create graphs in Excel. Next, they will use what they learned to create an activity based on 'favorite pets' where they display hypothetical survey results in graphical form.

- b. analyze and create mathematics lessons using technology.  
Students will be required to construct lesson plans that contain technological components. Students will receive feedback on their lessons and given the opportunity to make adjustments in their plans.
- c. discuss educational technology resources for mathematics teachers.  
Students will take part in discussion forums posted on D2L in which they will discuss educational technology resources for mathematics teachers. For example, students will explore applets hosted on websites such as *Illuminations* and the *National Library of Virtual Manipulates*. The students will post reviews of several of the applets on D2L.
- d. apply findings from research on technology to mathematics education.  
Students will read research on technology and mathematics education (e.g., NCTM *Principles and Standards*, ISTE publications, etc.). They will discuss the research via discussion forums posted on D2L. They will be expected to use the results of the research when constructing lesson plans.
- e. recognize the types and purposes of educational software for mathematics.  
The course will be divided into several units. Each unit will focus on a different type of technology used in mathematics instruction (e.g., Excel, Geogebra, SmartNotebook, TI-71, TI-Ranger, etc.) In each case the technology will be introduced (through posted videos) in the context of mathematical concepts. This will ensure that students learn more than ‘button pushing.’
- f. develop and apply criteria for evaluating educational software.  
Throughout the course, students are expected to use the guidelines for appropriate uses of technology (see Garofalo et al) to evaluate how the respective technologies should, or should not, be used in mathematics instruction. For example, calculators should not be used on worksheets designed to practice multiplication facts. However, calculators can be used to discover patterns related to multiplication facts (e.g., multiplying a number by 10 moves the decimal one place to the right).

**3. How will instructor-student and student-student, if applicable, interaction take place?**

The primary interface for this course will be D2L. This interface enables students to email and chat with the instructor. The instructor has also set up a Skype account so that he can “video chat” with students who need face-to face interaction. Open forums will be set up so that students can communicate with each other to collaborate on assignments.

#### **4. How will student achievement be evaluated?**

**Student achievement will be evaluated in much the same manner as in the traditional course. Students will complete projects, take quizzes, write lesson plans, and sit for a midterm and final exam. Evaluation will differ in that distance education students will also be evaluated on their responses to forum discussions. This will take the place of classroom discussions that occur in traditional sections of the course.**

#### **5. How will academic honesty for tests and assignments be addressed?**

**Students will be required to digitally sign an honor statement on each exam. The exam questions will be drawn from a pool of questions, so each exam will be somewhat different. Much of the grading criteria will be based on responses to discussion topics and reflections on readings. These assignments will be submitted through each student's individual account on D2L. For the lesson plan assignment, each student will be required to participate in an online discussion with the instructor before submitting the final version of their plan.**

**DE Syllabus  
MATH 459  
Technology in Elementary/Middle-Level Mathematics Instruction**

**Instructor: Dr. Brian D. Sharp      Phone: 357-2600      E-mail: bds@iup.edu**

**Address:      216 Stright Hall  
Department of Mathematics  
Indiana University of Pennsylvania  
Indiana, PA 15705**

Monday	Tuesday	Wednesday	Thursday	Friday
	Math 460 9:30 – 10:45		Math 460 9:30 – 10:45	
	<b>Office Hours 11:00 – 12:30</b>	<b>Office Hours 11:20-12:20</b>	<b>Office Hours 11:00 – 12:30</b>	
Math 105 12:20-1:10		Math 105 12:20-1:10		Math 105 12:20-1:10
	<b>Office Hours 5:00-6:00</b>			
	Math 459 ELMA 559			
	6:00-8:40			

**COURSE PREREQUISITES: MATH 152**

**REQUIRED TEXT:**

**No specific textbook has been selected for this course. This course requires the availability and use of a computer and a reliable Internet connection. A TI-83+/84 graphing calculator is also required.**

**COURSE PROCEDURES:**

**Teaching mathematics with technology is more than learning a new set of procedures to replace paper and pencil algorithms; technology must meaningfully assist in the learning of mathematics through problem solving, communication, reasoning, making connections, and representing data.**

The emphasis of this course is in developing knowledge, skills, and perspectives required for using educational technology in teaching mathematics at the elementary and middle school levels that are consistent with principles of cognitive psychology, research in mathematics education, and good teaching practices.

D2L will be the main interface for this course. There will be 14 modules that correspond to the 14 weeks of class. Each module will contain video clips, PowerPoint presentations, readings, and/or other materials to help you learn how to use technology appropriately. Each module will also contain assignments for you to complete. You will submit your assignments to the appropriate D2L dropbox or discussion board.

For example, during Week 1, you will watch video clips related to the basics of Excel spreadsheets. After you watch the video clips, you will create a Gradebook spreadsheet using Excel and upload your spreadsheet to the Gradebook dropbox. You will also read the Technology Principle by NCTM. After reading the chapter, you will submit responses to questions posted on the Technology Principle discussion board.

Getting help: If you encounter any difficulties in this course, please contact me as soon as possible. We can set up Skype sessions if you are unable to visit me on campus.

Assignment Submission Policy: Each assignment will have a specific deadline before which students need to submit their work. Once a deadline has passed, assignments associated with the respective deadline will not be accepted. Make-up quizzes and exams will only be administered in extreme circumstances.

#### Evaluation:

Your grade will be determined by a variety of assessments. These include:

Assignments – These assignments are designed to provide you with practice using technology and developing appropriate instructional techniques. Most of these assignments will be submitted via D2L.

Participation- This will be measured by the quality and quantity of your responses to discussion board posting.

Quizzes – Quizzes will be given to assess your understanding of topics covered in class as well as in the readings.

Midterms – A midterm exam will be posted after Week 7. The midterm must be completed prior to Week 9

Final Exam – The final exam will be posted after Week 14. The final exam must be completed prior to the Friday of finals week.

**Lesson Plan**– You will develop a technology-intensive lesson plan during this course. The plan should follow the departmental format. You will submit a video or PowerPoint presentation of your lesson Prior to Week 14. You will evaluation the lesson plans of two other students in the class during Week 14. We will discuss the lesson plan during Week 7 after you have some experience using various technologies.

The final grade for the course will be determined as follows:

- 10% Technology-based Lesson Plan. The Technology-based Lesson Plan is the key assessments.
  - 10% Quizzes
  - 10% Participation
  - 30% Projects
  - 20% Midterm
  - 20% Final
- 
- A: 90%-100%
  - B: 80%-89%
  - C: 70%-79%
  - D: 60-69%
  - F: 0%-59%

## **COURSE OUTLINE**

**A. Mathematics Education Research Resources/Instructional uses of Spreadsheets**  
(*Outcomes #1, #3, #4, #6*) 12 academic hours

### **Week 1:**

- a. Research on using technology in the mathematics classroom
  - a. NCTM Readings
  - b. ISTE readings
  - c. Students responses to readings on discussion board
- b. Introduce Microsoft Excel
  - a. Formulas
  - b. Cell attributes and formatting
    - i. "Gradebook" assignment

### **Week 2:**

- a. Spreadsheet Features Continued
  - a. Creating Magic Squares assignment
    - i. Sum features
    - ii. Cell orientations
    - iii. Cell protection

- b. **Creating Guess My Rule assignment**
  - i. **If-then statements**
  - ii. **Conditional formatting**

**Week 3:**

- a. **Spreadsheet Features Continued**
  - a. **Creating Function Machines assignment**
    - i. **Error checking**
    - ii. **Empty quotes**
  - b. **Creating Graphs assignment**
    - i. **M&M activity**
    - ii. **bar graphs, pie charts, line graphs**
  - c. **Probability Simulation assignments**
    - i. **Random number generators**
    - ii. **Count-if**
    - iii. **Coins, dice, and spinners**

**Week 4:**

- a. **Spreadsheet Features Continued**
  - a. **Adam Ant Skip Counting assignment**
    - i. **Scroll bars**
  - b. **Temperature Conversion assignment**
  - c. **Fraction Pie Assignment**
    - i. **Using scroll bars to manipulate graphs**

**B. Internet Resources and Applets/ Theories of Learning**  
*(Outcomes #1, #3, #4, #5, #6)*

**9 academic hours**

**Week 5:**

- a. **Introduction to Interactive Whiteboards**
  - a. **Inserting figures and text**
  - b. **Using the Teacher toolkit and interactive galleries**
  - c. **Fraction Rod assignment**
    - i. **Infinite cloner tool**
    - ii. **Locking figures**
  - d. **Whack-A-Mole assignment**
    - i. **Question tiles**
    - ii. **Hyperlinks**



**Week 6:**

- a. **Whiteboards Continues/NCTM Resources**
  - a. **Basketball Assignment**
    - i. **Touch sensitivity**
    - ii. **Image tiles**
    - iii. **Counter/Stopwatches**
  - b. **NCTM Illuminations**
    - i. **Evaluations of applets assignment**
    - ii. **Connections to Common Core**

**Week 7:**

- a. **Midterm/Virtual Manipulative Library/Constructivism**
  - a. **Midterm Exam Provided (Due prior to Week 9)**
  - b. **National Library of virtual Manipulatives**
    - i. **Evaluation of applets assignment**
  - c. **Constructivism Readings**
  - d. **Students responses to readings on discussion board**
  - e. **Discussion of Lesson Plan assignment**

**Week 8: Midterm Exam**

**C. Dynamic Geometry Software/Digital Imagery**  
*(Outcomes #1, #3, #5, #6)*

**9 academic hours**

**Week 9:**

- a. **Overview of dynamic geometry software**
  - a. **Introduction to Geogebra**
    - i. **Construction versus drawing**
    - ii. **Generating function graphs**
  - b. **Euclidean Constructions assignment**
    - i. **Equilateral triangles**
    - ii. **Perpendicular bisectors**
    - iii. **Angle bisectors**
    - iv. **Other constructions**

**Week 10:**

- a. **Shapemakers**
  - a. **Developing definitions of various quadrilaterals**
  - b. **Developing definitions of various triangles**
    - i. **Can You Make It assignment**
    - ii. **Shape Safari assignment**
- b. **Transformational geometry**
  - a. **Flips, slides, and turns**
  - b. **Algebraic transformations**
    - i. **Tessellation assignment**

**Week 11:**

- a. **Importing digital images**
  - a. **Types of symmetry**
    - i. **Symmetry Safari assignment**
  - b. **Pegging pictures**
    - i. **Slope and rooftop assignment**
  - c. **Using ratios and proportions to analyze digital images**
    - i. **Garrett's height assignment**

**D. Calculators and Probes**

*(Outcomes #1, #3, #4, #5, #6)*

**6 academic hours**

**Week 12:**

- a. **Orientation and fundamentals**
  - a. **Differences between types of calculators**
    - i. **Truncation**
    - ii. **Order of operations**
    - iii. **Memory**
  - b. **Teaching basic skills, number concepts, and algebra**
    - i. **Broken key game**
    - ii. **Up the Mountain, Down the Mountain**
    - iii. **Rational Number Rally**
  - c. **Current research and classroom usage**
    - i. **Calculator readings**
    - ii. **Students responses to readings on discussion board**

**Week 13:**

- a. **Data collection devices and probes**
  - a. **Ti-Ranger**
    - i. **Walk The Graph**
    - ii. **Bouncing ball**
    - iii. **Echolocation game**
    - iv. **Qualitative graph writing assignment**
  - b. **Temperature Probe**
    - i. **Law of Cooling**

**Week 14: Technology-based Lesson Plan Presentations**

*(Outcome #2)*

**3 academic hours**

## Syllabus of Record

### I. Catalog Description

**MATH 459 Technology in Elementary/Middle Level Mathematics Instruction (3c-01-3cr)**  
**Prerequisite MATH 152**

Develops the knowledge, skills, and perspectives required for using educational technology in teaching mathematics at the Elementary/Middle Level. Hands-on experiences with technology are an important focus.

### II. Course Outcomes

Students will:

- g. employ various forms of educational technology for teaching mathematics. PDE Guidelines: I.F.1, I.F.6, I.F.9, II.B.1.c, II.B.6.f
- h. analyze and create mathematics lessons using technology. PDE Guidelines: I.F.1, I.F.6, I.F.9, II.B.1.c, II.B.6.f
- i. discuss educational technology resources for mathematics teachers. PDE Guidelines: I.F.1, I.F.6, I.F.9, II.B.1.c, II.B.6.f
- j. apply findings from research on technology to mathematics education. PDE Guidelines: I.F.1, I.F.6, I.F.9, II.B.1.c, II.B.6.f
- k. recognize the types and purposes of educational software for mathematics. PDE Guidelines: I.F.1, I.F.6, I.F.9, II.B.1.c, II.B.6.f
- l. develop and apply criteria for evaluating educational software. PDE Guidelines: I.F.1, I.F.6, I.F.9, II.B.1.c, II.B.6.f

Course Outcomes	College Conceptual Framework / Danielson	INTASC Standard/ Principle	NCATE / NCTM Middle Level Mathematics Standards	Course Assessment Measuring Outcome
#1	1	1, 4	1, 3, 4, 5, 6, 8	Projects, Quizzes, Midterm, Final
#2	1	1, 4	1, 3, 4, 5, 6, 8	Key Assessment: Technology-based Lesson Plan
#3	1	1, 4	1, 3, 4, 5, 6, 8	Projects, Quizzes, Midterm, Final
#4	1	1, 4	1, 3, 4, 5, 6, 8	Projects, Quizzes, Midterm, Final
#5	1	1, 4	1, 3, 4, 5, 6, 8	Projects, Quizzes, Midterm, Final
#6	1	1, 4	1, 3, 4, 5, 6, 8	Projects, Quizzes, Midterm, Final

### III. Course Outline

- A. Internet Resources and Applets/ Theories of Learning  
(*Outcomes #1, #3, #4, #5, #6*) 9 academic hours
  - a. NCTM Resources
  - b. Virtual Manipulatives
  - c. Other web resources
  - d. Theories of learning and how it relates to the use of technology in the mathematics classroom
- B. Mathematics Education Research Resources/Instructional Uses of Spreadsheets  
(*Outcomes #1, #3, #4, #6*) 12 academic hours
  - a. Research on using technology in the mathematics classroom
  - b. Spreadsheet Features
  - c. Using spreadsheets to create mathematical lessons such as Fraction Pies, Random Event Simulations, Magic Squares, Function machines, etc.
- C. Dynamic Geometry Software/Digital Imagery  
(*Outcomes #1, #3, #5, #6*) 9 academic hours
  - a. Overview of dynamic geometry software
  - b. Uses of Digital Imagery for mathematics instruction
- D. Calculators and Probes  
(*Outcomes #1, #3, #4, #5, #6*) 6 academic hours
  - a. Orientation and fundamentals
  - b. Teaching basic skills, number concepts, and algebra
  - c. Problem –solving approaches to teaching
  - d. Current research and classroom usage
  - e. Data-collection devices and the teaching of algebra, probability, and statistics
- E. Technology-based Lesson Plan Presentations  
(*Outcome #2*) 3 academic hours

This syllabus covers 39 academic hours, leaving 3 academic hours for testing and/or review. The final is an additional 2 academic hours.

### IV. Evaluation Methods

The final grade for the course will be determined as follows:

- 10% Technology-based Lesson Plan. The Technology-based Lesson Plan is the key assessments and shall be required of all instructors.
- 10% Quizzes

10%	Participation
30%	Projects
20%	Midterm
20%	Final

The Technology-based Lesson Plan is the Key Assessment, comprising 10% of the course grade, and shall be required of all instructors.

## **V. Grading Scale**

A:	90%-100%
B:	80%-89%
C:	70%-79%
D:	60-69%
F:	0%-59%

## **VI. Undergraduate-Course Attendance Policy**

Attendance policy will conform to university guidelines.

## **VII. Required Textbook**

None.

## **VIII. Special Resource Requirements**

This course requires the availability and use of the computer lab, a portable computer and display unit, video technology, a classroom set of graphing calculators with calculator-based laboratory units, and a classroom set of four-function and fraction calculators. The computer lab must have commercially-available, up-to-date software: word processor, spreadsheet, geometry exploration software, Internet browser, presentation and multimedia authoring program. Additionally, a cadre of up-to-date educational software for the teaching and learning of mathematics must be maintained and available. At present, the Mathematics Department has a lab that meets these requirements.

### **Technical Support:**

For questions regarding Desire2Learn and using the system, contact the 24/7 Perceptis Helpdesk at [1-877-730-6229](tel:1-877-730-6229) or via the Web at <http://smartipantz.perceptis.com/Indiana>. To obtain technical support for computer issues related to this course, please contact Indiana University of Pennsylvania's student helpdesk at [724-357-4000](tel:724-357-4000), Monday–Friday, between 7:30AM and 5:30PM Eastern Time (ET). You should be prepared to give specific details regarding your technical issue(s), including what you were doing before the error occurred and the exact text of any error messages received. If you experience issues outside of the normal helpdesk hours, you can also submit your error via e-mail at [it-support-center@iup.edu](mailto:it-support-center@iup.edu) or via electronic form available online at

<http://www.iup.edu/itsupportcenter/help>. If you are not familiar with Distance Education, please visit this site for guidance. (Library Services)  
<http://www.iup.edu/page.aspx?id=77153>

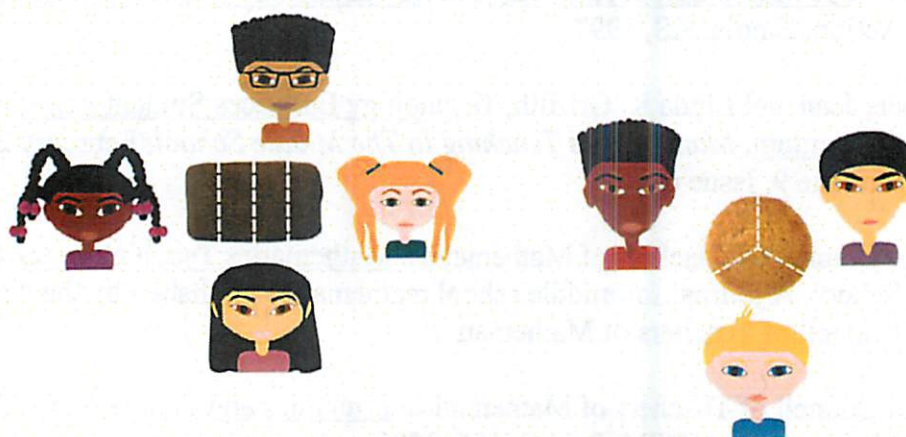
## IX. Bibliography

- Baker, J. Making More of an Average Lesson: Using Spreadsheets to teach Preservice Teachers about Average. In *Teaching and Learning Mathematics with Technology, 1997 Yearbook*. G. Blume & M. Heid (eds.). Pennsylvania Council of Teachers of Mathematics. 1997.
- Cory, S. & Walker, M., LOGO Works: Lessons LOGO, Terrapin Software Inc., Portland, ME 1995.
- Cyrus, Vivian Flora, and Ben V. Flora Don't Teach Technology, Teach with Technology, Mathematics Teaching In The Middle School, October 2000, Volume 93, Issue 7
- Flores, Alfinio, Using Technology in Your Classroom, ON-Math 2006, Volume 4, Number 1
- Forcier, R., The Computer as an Educational Tool: Productivity and Problem Solving, Second Edition, Merrill, Upper Saddle River, NJ, 1999.
- Garofalo, J., Drier, H., Harper, S., Timmerman, M., & Shockey, T., Promoting appropriate uses of technology in mathematics teacher preparation. *Contemporary Issues in Technology and Teacher Education*, 1(1), 66-88, 2000.
- Glass, Brad, Transformations and Technology, Mathematics Teaching In The Middle School, March 2004, Volume 9, Issue 7
- Heid, K., Algebra in a Technological World, Addenda Series, National Council of Teachers of Mathematics, 1995.
- Hillman, Susan L. and Cathy M. Malotka, Changing Views: Fearless Families Conquering Technology Together, Mathematics Teaching In The Middle School, November 2004, Volume 10, Issue 4
- Kaput, J., Technology Mathematics Education. In *Handbook of Research on Mathematics Teaching and Learning*. D. Grouws (ed.) National Council of Teachers of Mathematics. 1992.
- Kearsley, G., Hunter, B & Furlong, M., We Teach With Technology, Franklin, Beedle & Associates, Inc., Wilsonville, OR, 1992.

- Kline, Kate, Kim J. Thach and Kimberly A. Norman Using TARGETTS to Create Learning Environments That Support Technology-Rich Mathematics Instruction, *Teaching Children Mathematics*, October 2008, Volume 15, Issue 3.
- Kursat Erbas, A., Sarah Ledford, Drew Polly and Chandra H. Orrill, Engaging Students through Technology, *Mathematics Teaching In The Middle School*, February 2004, Volume 9, Issue 6.
- Kursat Erbas, A., Sarah Ledford, Chandra Hawley Orrill and Drew Polly, Promoting Problem Solving across Geometry and Algebra by Using Technology, *Mathematics Teaching In The Middle School*, February 2004, Volume 9, Issue 6.
- Lamb, A., The Magic Carpet Ride: Integrating Technology into the Classroom, Vision To Action, Emoia, KS, 1997.
- McGehee, Jean and Linda K. Griffith, Technology Enhances Student Learning across the Curriculum, *Mathematics Teaching In The Middle School*, February 2004, Volume 9, Issue 6.
- National Council of Teachers of Mathematics. Mathematics Teaching in the Middle School. A journal for middle school mathematics published by the National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. Principles and Standards for School Mathematics. NCTM, Reston, VA, 2000.
- National Council of Teachers of Mathematics. Teaching Children Mathematics. A journal for elementary school mathematics published by the National Council of Teachers of Mathematics.
- Papert, S. Mindstorms: Children, Computers, and Powerful Ideas, Basic Books, Inc. 1980.
- Public Broadcasting System (PBS), Life by the Numbers (a television series), 1998.
- Roblyer, M.D. and others. Integrating Educational Technology into Teaching. Prentice Hall. 1997.
- Timmerman, Maria A., Using the Internet: Are Prospective Elementary Teachers Prepared to Teach with Technology?, *Teaching Children Mathematics*, April 2004, Volume 10, Issue 8.
- Wiebe, J., Computer Tools and Problem Solving in Mathematics, Franklin, Beedle & Associates, Inc., Wilsonville, OR, 1993.

## Sample Lesson – Screenshots of PowerPoint Slides

### Equal Sharing and Early Fraction Concepts



Read the following articles

Gould, H. T. (2011). Building understanding of fractions with LEGO® bricks. *Teaching Children Mathematics*, 17(8), 498.

Wilkerson, T. L., Bryan, T., & Curry, J. (2012). An appetite for fractions.. *Teaching Children Mathematics*, 19(2), 90.

Kikosicki, L., & Prekeges, D. (2012). A fraction feast. *Teaching Children Mathematics*, 19(3).

Wilson, P. H., Myers, M., Edgington, C., & Confrey, J. (2012). Fair shares, matey, or walk the plank. *Teaching Children Mathematics*, 18(8), 482.

Garofalo, J., & Sharp, B. D. (2003, April). Teaching fractions using a simulated sharing activity. (Mathematics). *Learning & Leading with Technology*, 30(7), 36.



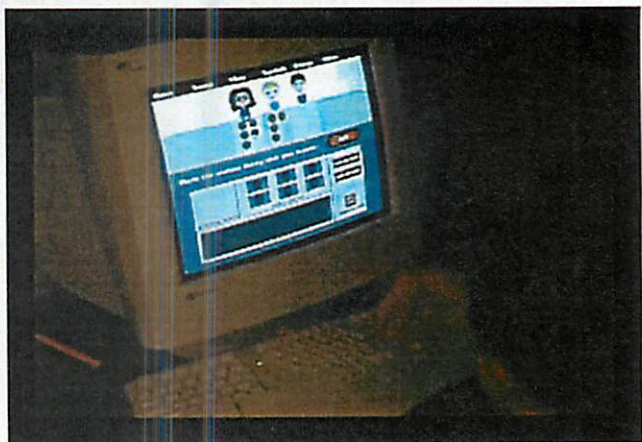
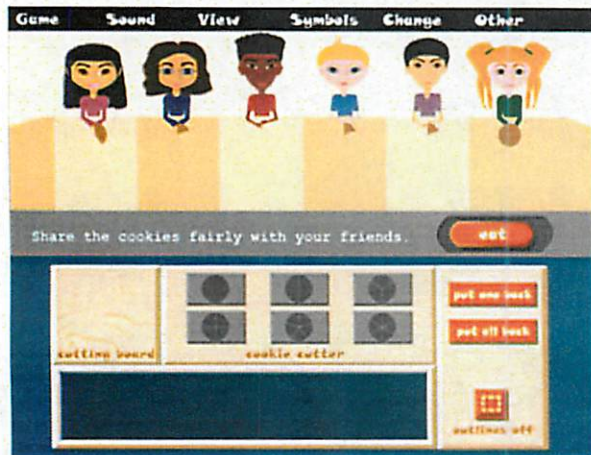
Now that you have read about equal sharing and early fraction concepts, respond to the following topics. Post your responses on D2L under the Lesson 3 discussion section.

1. What is meant by 'equal-sharing tasks?' Why do the authors contend that equal-sharing tasks make for a good basis to teach early fraction concepts? What do you think about using equal-sharing tasks as a basis for teaching early fraction concepts?
2. What were some common strategies that children used while solving 'equal-sharing tasks?' Why do you think children came up with these strategies?
3. What were some misconceptions that children displayed while solving 'equal-sharing tasks?' Why do you think some children had these misconceptions? What would you do to enable children to overcome these misconceptions?

1. Download the Kids and Cookies applet and documentation from [www.teacherlink.org/KidsAndCookies](http://www.teacherlink.org/KidsAndCookies).

2. Using the applet, work through the tasks on Worksheet 1.

## Screenshots of Kids and Cookies for your reference



## Worksheet 1: Cookie Tasks

Before you begin: Make sure the sound is turned on. Make sure the symbol feature is turned on. Take screenshots as needed to use in your evaluation of the program. I placed a short video on D2L that demonstrates the features of Kid and Cookie. You will probably want to watch the video before you begin.

1. Select 3 kids to share 3 cookies
2. Select 3 kids to share 6 cookies
3. Select 3 kids to share 2 cookies
4. Select 4 kids to share 2 cookies
5. Select 4 kids to share 2 cookies with the fourths cutter turned off

## Creating Your Own Fraction Rods Activity

You already know enough about SmartNotebook to create your own version of Fraction Rods. So for this assignment, you are going to use SmartNotebook to create a scaled down version of the online applet. In your version, don't worry about the features that were in the menu bars.

Your version of Fraction Rods should:

1. Use the infinite cloner feature to generate fractions rods and marking sticks
2. Contain fraction rods from 'one' to 'twelve'
3. Have a page that contains sample questions that you would ask during a lesson that uses your manipulative. There should be a mixture of low, middle, and high-level questions.

The screenshot below represents possible student work. Work will be evaluated on functionality, neatness of design, and appropriateness of the questions.



### Fraction Rods Rubric

	2 points	1 point	0 points
<b>Colors</b>	All rods were appropriate colors	Most rods were appropriately colored	Inappropriate color choices
<b>Size</b>	All rod lengths were the appropriate size	One rod length was the inappropriate size	More than one rod length was the inappropriate size
<b>Layout</b>	The overall layout of the page was appropriate and neatly presented	One or two parts of the page were messy or inappropriately placed	Multiple parts of the page were messy or inappropriately placed
<b>Questions</b>	Questions were appropriate to tasks. Multiple question levels were included.	Questions were appropriate to tasks. Multiple question levels were not included.	Questions were inappropriate to tasks. Multiple question levels were not included.

Now that you have experience with Kids and Cookies, it is time to evaluate it.

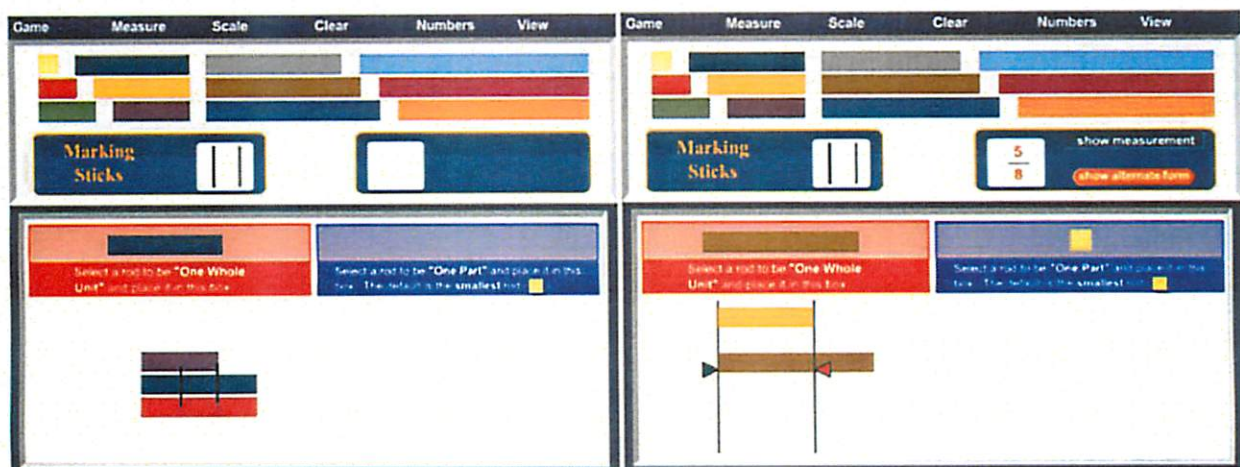
Write a two-page evaluation of the applet.

- Identify its strengths and weaknesses.
- Discuss how it might be used as part of a lesson.
- Identify what, if any, Common Core Standards are related to this applet.

Make sure you back up your evaluation with references from the readings. Submit your evaluation into the Kids and Cookies dropbox before 3/12/14.

- Download the Fraction Rods applet and documentation from <http://www.teacherlink.org/content/math/interactive/flash/Fraction%20Rods/FractionRods.html>.
- Using the applet, work through the task on Worksheet 2.

Screenshots of Fraction Rods for your reference



## Worksheet 2: Fraction Rods

Before you begin: I placed a short video on D2L that demonstrates the features of Fraction Rods. You will probably want to watch the video before you begin. Essentially, these rods work like Cuisenaire rods. Take screenshots as needed to use in your evaluation of the program.

1. If dark green is the whole, what fraction does red represent?
2. What fraction of the brown rod is the red rod?
3. If the yellow rod is five-fourths, what rod is one whole?
4. If the purple rod is one-third, what rod is one whole?
5. If the orange rod is five-fourths, what rod is one whole?
6. Model  $\frac{1}{2} + \frac{1}{3}$
7. Model  $\frac{1}{2}$  divided by  $\frac{1}{6}$
8. Model  $\frac{7}{8}$  divided by  $\frac{1}{4}$

Now that you have experience with Fraction Rods, it is time to evaluate it.

Write a two-page evaluation of the applet.

- a. Identify its strengths and weaknesses.
- b. Discuss how it might be used as part of a lesson.
- c. Identify what, if any, Common Core Standards are related to this applet.

Make sure you back up your evaluation with references from the readings. Submit your evaluation into the Fraction Rods dropbox before 3/12/14.