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Technology for Math Enrichment

Course Syllabus
3 Graduate-Level Continuing Education Units, Brandman University

Course Author and Instructor:
This course was created through collaboration with many mathematics experts, and drawing upon the works of Jo Boaler, Dan Myers, and other inspiring math educators. It is authored by Ruth Wise, an elementary school teacher and a CCSS Mathematics Fellow in her district. The course is primarily instructed by Randy Chang, a UCLA graduate with his teaching credential in secondary education.

Course Objective & Learning Goals: This course will feel like sitting at a "dinner table" with teachers like yourself who are looking for excellent ideas, scenarios, and tools to help make math concepts relevant to students in the classroom. Each lesson in this course focuses on one domain of the Common Core State Standards for Math Content, in the order that they are enumerated for Grades K-8. Although not all of the domains are assigned to every grade, all of the domains are essential to math mastery, and completing this course gives every participant a thorough view of the foundational common core math standards from one particular angle, that is, through the Standard for Math Practices #5: Using Appropriate Tools Strategically, and specifically the use of computer technology as a tool for posing and solving problems and for exploring and deepening math concept understanding.

Course Outline:

Lesson 1: Posing and Solving Problems involving: Operations and Algebraic Thinking or Equations and Expressions In this lesson, two domains (two knowledge areas) are listed: 1) Operations and Algebraic Thinking and 2) Equations and Expressions. The sample standards listed and activities proposed focus on the domain Operations and Algebraic Thinking, with the standards for 1st Grade, although in the coursework and homework, teachers focus on their own grade level, and teachers of Grades 6-12 focus on Expressions and Equations to create their own relevant activities. In this lesson and all the odd-numbered lessons below, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

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Lesson 2: Exploring and Deepening Understanding of Operations and Algebraic Concepts (Teachers of Grades 6-12, focus on Expressions and Equations) This lesson, as well as all of the following even-numbered lessons, focuses on the same domain as was covered in the foregoing lesson. Teachers use the curriculum framework to increase their understanding of this content of this domain. In the even-numbered lessons, participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For example, participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other real-life application of math concepts.

Lesson 3:Posing and Solving Problems involving Number and Operations in Base 10 (Teachers of Grades 6-12, focus on the Number System) In this lesson, two domains are listed: 1) Number and Operations in Base 10, and 2) The Number System. The sample standards listed and activities proposed focus on the domain Number and Operations in Base 10 for Grade 2, although for the coursework and homework, teachers focus on their own grade level, and teachers of Grades 6-12 focus on the Number System to create their own relevant activities. In this lesson, as in all the odd-numbered lessons, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 4: Exploring and Deepening Understanding of Number and Operations in Base 10(Teachers of Grades 6-12, focus on the Number System) This lesson focuses on the same domain as was covered in Lesson 3. Teachers use the curriculum framework to increase their understanding of the content of this domain. In the even-numbered lessons, participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For example, participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other real-life application of math concepts.

Lesson 5: Posing and Solving Problems involving Number and Operations: Fractions (Teachers of Grades K-2, focus on Grade 3; Teacher of Grades 6-12, focus on Grade 5 standards of this domain) In this lesson, the domain focused on is Number and Operations: Fractions, and the standards listed and sample activities proposed are for Grade 3, although in completing the coursework and homework, teachers focus on their own grade level's standards to create their own relevant activities (or the grade level closest to their grade level, that has this domain). In this lesson, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 6: Exploring and Deepening Understanding of Numbers and Operations: Fractions (Teachers of Grades K-2, focus on Grade 3; Teacher of Grades 6- 12,focus on Grade 5 standards of this domain) This lesson focuses on the same domain as was covered in Lesson 5. Teachers use the curriculum framework to increase their understanding of this content of this domain. Participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For, participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other real-life application of math concepts.

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Lesson 7: Posing and Solving Problems involving Measurement and Data (Teachers of Grades 6-12, focus on Grade 5 standards of this domain) In this lesson, the domain focused on is Measurement & Data, and the standards listed and sample activities proposed are for Grade 4, although in completing the coursework and homework, teachers focus on their own grade level's standards to create their own relevant activities (or the grade level closest to their grade level, that has this domain). In this lesson, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 8: Exploring and Deepening Understanding of Measurement and Data (Teachers of Grades 6-12, focus on Grade 5 standards of this domain) This lesson focuses on the same domain as was covered in Lesson 7. Teachers use the curriculum framework to increase their understanding of this content of this domain. Participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For example, participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other real-life application of math concepts.

Lesson 9: Posing and Solving Problems involving Geometry In this lesson, the domain focused on is Geometry, and the standards listed and sample activities proposed are for Grade 5, although in completing the coursework and homework, teachers focus on their own grade level's standards to create their own relevant activities (or the grade level closest to their grade level, that has this domain). In this lesson, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 10: Exploring and Deepening Understanding of Geometry This lesson focuses on the same domain as was covered in Lesson 9. Teachers use the curriculum framework to increase their understanding of this content of this domain. Participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For, example participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other possible presentations of real-life application of math concepts.

Lesson 11: Posing and Solving Problems involving Ratios and Proportional Relationships (Teachers of Grades K-5, focus on standards for Grade 6 of this domain) In this lesson, the domain focused on is Ratios and Proportional Relationships, and the standards listed and sample activities proposed are for Grade 6, although in completing the coursework and homework, teachers focus on their own grade level's standards to create their own relevant activities. Participants should create activities for their grade level that touch on related concepts if possible, and otherwise should propose activities fitting for the grade level closest to that which they teach that addresses this domain. In this lesson, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 12: Exploring and Deepening Understanding Ratios and Proportional Relationships (Teachers of Grades K-5, focus on standards for Grade 6 of this domain) This lesson focuses on the same domain as was covered in Lesson 11. Teachers use the curriculum framework to increase their understanding of this content of this

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domain. Participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For example, participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other real-life application of math concepts. If there is no tie-in with your grade level and the standards in this domain, design a project lesson plan that would be appropriate for the grade level nearest yours that addresses this domain.

Lesson 13: Posing and Solving Problems involving Statistics and Probability (Teachers of Grades K-5, focus on standards for Grade 6 of this domain) In this lesson, the domain focused on is Statistics & Probability, and the standards listed and sample activities proposed are for Grade 7, although in completing the coursework and homework, teachers focus on their own grade level's standards (or those of the grade level closest to the grade level they teach). Participants should create activities for their grade level that touch on related concepts if possible, and otherwise should propose activities that would address the standards for the grade level closest to theirs. In this lesson, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 14: Exploring and Deepening Understanding of Statistics and Probability (Teachers of Grades K-5, focus on standards for Grade 6 of this domain) This lesson focuses on the same domain as was covered in Lesson 13. Teachers use the curriculum framework to increase their understanding of this content of this domain. Participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For example, participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graph of data, or other real-life application of math concepts. If your grade level does not contain this domain, design a project for the grade level closest to that which you teach, which contains the pertinent domain.

Lesson 15: Posing and Solving Problems involving Functions (all K-8 teachers use Grade 8 standards; High School teachers may use Grade 8 or High School Functions standards, depending on teachers' math proficiency) In this lesson, the domain focused on is Functions, and the standards listed and sample activities proposed are for Grade 8, although in completing the coursework and homework, teachers focus on their own grade level's standards (or those of the grade level closest to the grade level they teach). Participants should create activities for their grade level that touch on related concepts if possible, and otherwise should propose activities that would address the standards for the grade level closest to theirs. In this lesson, teachers see, practice, and share ways to use technology, as well as real-world scenarios when possible, to pose and answer math problems.

Lesson 16: Exploring and Deepening Understanding of Functions (all K-8 teachers use Grade 8 standards; High School teachers may use Grade 8 or High School Functions standards, depending on teachers' math proficiency) This lesson focuses on the same domain as was covered in Lesson 15. Teachers use the curriculum framework to increase their understanding of this content of this domain. Participants design one activity that preferably provides integration with other content area(s) to contextualize the math content standards of this domain, and to give students virtually "authentic" learning opportunities through technology usage. For example,

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participants may create a lesson that extends the math concepts being taught, requiring students to conduct some research, create a short book or report, create graphs of data, or other real-life application of math concepts. If your grade level does not address this domain, plan a lesson/project that could be used by a teacher who teaches the grade level closest to yours that does address this domain.