










NATIVE AMERICAN-BASED MATERIALS FOR INTEGRATION INTO UNDERGRADUATE MATHEMATICS COURSES



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Co-PI Myles Pfahl
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PRESENTATION OUTLINE

- Welcome and Introductions
- Project Purpose and Summary
- Project Description and Objectives
- Integration into Courses
- Lesson Piloting Protocol
- Facebook Page and Website
- The Lessons



INTRODUCTIONS

Miles Pfahl

- Mathematics Instructor
16 years at Turtle Mountain Comm. Coll. located on the Turtle Mountain Chippewa Res. Belcourt, ND
- Mathematics Teacher
12 years at Turtle Mountain Comm. High School
- Project Director, PI, Co-PI
Numerous grants and programs (7-12 and higher ed)



Dr. Charles Funkhouser

- Mathematics Professor
20 years at the University of Wyoming and Cal State Universities
- Math and Computer Sci. Teacher
17 years at Frenchtown High School, Frenchtown, Montana
- NSF Project PI
2003 – 2007 TUES Type I
2011 – present TUES Type 2

MORE INTRODUCTIONS

- Harriet Edwards – Co-PI at California State University – Fullerton
- Patrick Weasel Head – Project Tribal Cultural Liaison
University of Montana (retired)
- Luther Olson – Project Materials Developer
Mathematics Instructor, Minot State University
- Roberto Wheaton – Project Materials Developer
High School History - Science Instructor – Desert Hot Springs, CA
- Michael Little Crow – Project Materials Developer
Mathematics Instructor, Scottsdale Community College
- Cecelia Myerion and Frances Allard Abbott – Cultural Advisors
Turtle Mountain Community College






PURPOSE

Infrequently mentioned in most mathematics instructional settings in the US is a parallel, rich system of mathematics developed and used by indigenous people of North America.



- These materials allow instructors of undergraduate courses to infuse culturally relevant and interesting mathematics activities into their courses.
- These materials will not only allow Native American students to be more fully involved in their learning, but also give all students a fuller appreciation of the universal nature and power of mathematics.

NATIVE AMERICAN BASED MATERIALS FOR INTEGRATION INTO UNDERGRADUATE MATHEMATICS COURSES



PROJECT SUMMARY

- Researches and develops undergraduate math materials based in the culture of Native American peoples.
- Materials are classroom ready.
- Various mathematical concepts that coincide with traditional math content in undergraduate courses.
- Give additional perspective as to how traditional math topics can be incorporated into real world situations in the Native American culture.


PROJECT DESCRIPTION

- CSUF and TMCC develop materials based in intellectual and cultural traditions of Native American peoples to be used in undergraduate math courses.
- Integrate these materials into mainstream university and Tribal Community college mathematics courses.
- Foster faculty expertise in the materials' mathematics, methods and cultural bases.
- Assesses the materials' effects on student and instructor attitudes.
- Make the materials available for dissemination to universities and Tribal Community colleges.





PROJECT OBJECTIVES

- 17 classroom ready lessons have been developed including a powerpoint presentation and instructor guide for each lesson.
- Materials have been piloted at CSUF, TMCC and other universities and community and Tribal colleges.
- Other technological enhancements have been developed such as a project website and Facebook page.
- Faculty training in deliverance of materials has taken place.
- Native American and other students will have integrated exposure to the traditional mathematics and methods of Native Peoples within courses taught in their undergraduate curriculum.



CONTINUED...



- University and Tribal college faculty will have an opportunity to integrate traditional mathematics and methods of Native Peoples into the undergraduate courses they teach.
- The following topics from Native American mathematics will be integrated and implemented into undergraduate course: number theory, numeration systems, topology, measurement, probability and chance, statistics and data mining and geometry.
- The appropriateness and efficacy of the materials used in undergraduate courses will be assessed and evaluated.
- Changes in student and instructor attitudes towards Native American traditional mathematics and intellectual traditions will be assessed.
- Results will be widely disseminated.




INTEGRATION INTO COLLEGE LEVEL MATHEMATICS COURSES




■ Following is a list of Potential Undergraduate mathematics courses where the developed lessons may be integrated:

- MATH 100 Applied Mathematics
- MATH 102 Intermediate Algebra
- MATH 1.11 College Algebra I
- MATH 1.12 College Algebra II
- MATH 103 University Algebra
- MATH 212 Statistics I
- MATH 213 Statistics II
- MATH 335 Mathematical Probability
- MATH 303 Fundamental Concepts in Elementary Mathematics
- MATH 380 History of Mathematics
- MATH 417 Foundations of Geometry
- MATH 402 Logic and Geometry for the Secondary Teacher.



LESSON PILOTING PROTOCOL



- Pre Attitude survey will be administered to the students participating in the project by faculty.
- Pre Attitude survey will be completed by the faculty member participating in the project.
- Post Attitude survey will be administered to both students and faculty participating in the project.
- A Post Student Focus Group session will be conducted after the lessons have been piloted.

Documents:

1. Survey Administration Instructions
2. Student Survey
3. Instructor Survey
4. Protocol for Student Focus Group



FACEBOOK PAGE



www.facebook.com/NativeAmericanMathematicsMaterials






THE PROJECT WEBSITE

<http://mathfaculty.fullerton.edu/cfunkhouser/>

Native American based Mathematics Materials

Home
This website is the result of a project that began in 2007. The goal was to create a resource for Native American mathematics materials. The website is a collection of materials that are available for use in the classroom. The materials are organized by lesson and include a variety of activities, games, and projects. The materials are designed to be used in a variety of ways and can be adapted to fit the needs of any classroom.

Lessons
This section contains a list of lessons that are available for use in the classroom. Each lesson includes a description of the lesson, a list of materials, and a link to the lesson page. The lessons are organized by topic and include a variety of activities, games, and projects.

Activities
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Games
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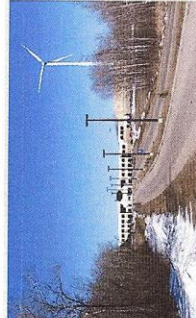




THE 17 LESSONS


- Transformational Geometry - Native Design
- Probability - Plumstone Game
- Numeration - Gesture Counting
- Geometry - Medicine Wheel
- Geometry - Tepee Surface Area and Volume
- Probability - Stick Game
- Numeration - Beading
- Geometry - Arrowheads
- Geometry - Beadwork
- Measurement - Hand Games
- Linear Programming - Native Clothing
- Geometry - Wigwam Surface Area
- Geometry - Tessellations Star Quilts
- Statistics - Diabetes Rates
- Geometry - Tepee Oblique Surface Area and Volume
- Algebra - Blood Quantum
- Numeration - Chippewa Grammar of Numbers

TAKE A LOOK AT A LESSON OR TWO

The Spirit Within Us!



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