ECC 2011 – Curriculum Panel

Panel Members:

- Prof. Benjamin Carle, Assistant Professor, Marist College
- Prof. Chu Jong, Illinois State University
- Prof. Eitel Lauria, Associate Professor, Marist University
- Prof. Anne Matheus, Assistant Professor, Marist College
- Prof. Cameron Seay, North Carolina Agriculture and Technical State University
- Prof. Suk-Chung Yoon, Widener University

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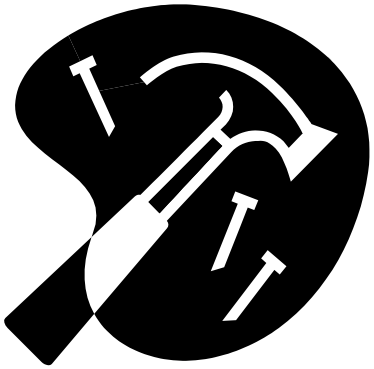
Agenda:

- Introduction – Roger Norton
- NSF CE-21 Initiative – Anne Matheus
  - Problem statement & Issues identified
- Proposed Approach – Ben Carle
  - Modular online courses
  - Schedule of deliverables
- Topic Area Examples:
  - Application in Business/Finance – Cameron Seay
  - Application in Data Mining and Analytics – Eitel Lauria,
- High School Outreach Examples
  - Widener University – Suk-Chung Yoon
  - Illinois State University – Chu Jong
- Questions

Why CE 21?

- Needed another acronym
  - Computing education
- Not enough people in the field
  - Dept. of Labor projects 11% of future jobs will be in technology
  - 2% of high school grads state an interest
- CS is too hard
  - Inadequate number of teachers
  - Not supported or without proper background
- “I already know all I need to know about Computers.’
  - Internet savvy students think high game scores and Wikipedia are all they need to know.

Current Issues



- Teachers are not trained
  - Given computers to use
  - Could be any field of study
  - Ineffective course development
- The AP course is no place to start
  - First year Java programming class
  - Low rate of success on the performance exam

Not Recreating the Wheel

- Computer Science Teachers Association
- College Board Gold standard course development
- UCLA and LA Unified School District
- Open Education Resources
- CPATH Enterprise Computing Community

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- Introduce students to computing principles
  - Problem solving
  - Abstract thinking
  - Instruction Writing
- Basic programming skills
  - Python
- Emphasize the importance of computation

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Computing Principles Course

- Offered Online through the Sakai OAE
- Nine technology modules
  - Computing principles
  - Basic programming skills
- Nine topic modules
  - Subject areas with computation-intensive problems and solutions

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- Topic Modules
  - Biology
  - Chemistry
  - Finance
  - Game Development
  - Health Analytics
  - Marketing
  - Enterprise Computing
  - Physics
  - Art

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- Graduate Course
  - Train teachers to teach the course
  - Includes instructional materials for each module

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- 3 Years, 300 Teachers, 300 Students
- Year I
  - Development team will create modules
- Year II
  - Train 300 HS teachers through graduate course
- Year III
  - Teach the course to 300 HS students

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Introducing Finance to High School Students

Goals:

- Use Project Based Learning (PBL) to teach the basics of finance
- Expose students to a relevant concept from finance: where does a stock's selling price come from
- Use analytics to determine if based on its current price a stock is or is not a good value
- Make a direct connection between finance concepts and everyday life: develop a software tool that allows students to create simulated competitive business environments.

In the process:

- Build math skill through problem solving activities
- Build writing skills through written exercises
- Develop expertise with tools that are used in the domain- spreadsheets, relational databases, statistical software, programming languages, etc.
- Help students to become effective global citizens

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Introducing Analytics and Data Mining Tools to High School Students

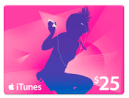
Leitmotif: The more ways you look at the data, the more fully you will understand their implications

Goals:

- Bring authentic, inquiry-based learning experiences into the classroom
- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
- Develop and evaluate inferences and predictions that are based on data
- Make the connection to everyday life

In the process:

- Build new mathematical knowledge through problem solving
- Use simple mathematical models to represent and understand quantitative relationships
- Recognize and apply mathematics in contexts outside of mathematics





Why: Kids understand data. They are, more than ever, continuously exposed to it

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Case: Linking chemistry and purchasing patterns

"Mega Mining Mart," was designed to provide an initial discussion on the arrangement of elements on periodic table to physical science students in a high school or junior high setting.

Goal: Help students identify trends and understand correlations in a familiar setting (a grocery store ad frequent buyers cards) and then apply this understanding to trends and correlations on the periodic table.

Students' prior learning includes knowledge about elements, compounds, states of matter, chemical changes, physical changes, and density.

The associations were of the form "Customers who buy X also buy Y." Students created categories for the items and then placed them in the store in a way that made sense to the customer (similar items grouped together) and satisfied the data mining associations.

Students were shown that the elements in the periodic table are arranged systematically and according to trends such as increasing atomic weight and increasing number of valence electrons.

Source: Richardson B., Davis K , Daniel Beach M., "Introducing Data Mining Techniques and Software Engineering to High School Science Students", 38th ASEE/IEEE Frontiers in Education Conference, 2008