Technology for the 21st Century Classroom

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Exploring the “T” in STEM
CEE/TEP, June 30, 2016
STEM Accelerator Program
College of Science
(2015 & 2016 VA Program that works Award)

Our Mission
Increase the number of STEM majors
Improve retention of STEM students
Reduce students time to graduation
Build capacity in the STEM workforce

STEM RETENTION
The Learning Assistants Program
STEM Boot camps
Oral Reviews/Peer-Peer Mentoring

STEM RECRUITMENT
COS Visits for High School Students
High School Mentorship Program
STEM Education Clubs

STEM FACULTY DEVELOPMENT
Discipline Based Education Research
Undergraduate Research Experiences
Faculty Research Grants Development

STEM JOBS WORKFORCE
STEM Internships & Fellowships
STEM Workforce Council

STEM Boot Camps

Peer-Peer Mentoring

STEM CURRICULUM DEVELOPMENT
High School Dual Enrollment
Professional Masters in Science
Governor School @ Innovation Park
STEAM & STEM-H Programs

STEM TEACHER PROGRAMS
NOYCE Teacher Scholarships
STEM Professional Development
STEM K-12 Math Science Partnerships
STEM High school of the Future

STEM K-12 OUTREACH
STEM Afterschool Programs
STEM Middle School Academies
STEM Science and Engineering Fair
STEM Elementary Summer Camps

STEM GLOBAL
NAS VLP/USAID PEER
Organization of American States
Teacher to Teachers International

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Transition through the Ages

• Industrial Age: Routine
  – Rules-based
  – Repetitive
  – Procedural

• Knowledge Age: Out-of-the-box thinking
  – Abstract Problem Solving
  – Teamwork and collaboration
  – Critical Thinking and Creativity
Teach less, Learn More

- Teacher-directed
- Direct Instruction
- Knowledge
- Content
- Basic Skills
- Facts and Principles
- Theory
- Curriculum
- Time-slotted
- One-size-fits-all
- Competitive
- Classroom
- Text-based
- Summative Tests
- Learning for School

- Learner-Centered
- Interactive exchange
- Skills
- Process
- Applied Skills
- Questions and Problems
- Practice
- Projects
- On-demand
- Personalized
- Collaborative
- Global Community
- Web-based
- Formative evaluations
- Learning for Life
Movie Math Quiz
How many of the 16 movies can you find?

\[ \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \]

\[ \pi \]

\[ \frac{1}{n} \sum_{i=1}^{n} i \]

1609.344 METRES

a + bi

\[ F = \{ x : x \text{ is a fear} \} \]

\[ \sum_{x \in F} x \]

[13]

\[ x \lor \{ \text{cist} \} \]

\[ (2i + 1, 2j + 1) \]

\[ e^{i\pi} + 1 = 0 \]

and

\[ 666 \]

\[ \frac{\partial u}{\partial t} - \alpha \nabla^2 u = 0 \]

\[ \left| \frac{ds}{dt} \right| \]

2.7182818284590452…
Movie Math Quiz
How many of the 16 movies can you find?

Matrix
\[
\begin{bmatrix}
a_{11} & a_{12} \\
a_{21} & a_{22}
\end{bmatrix}
\]

American Pi
\[\pi\]

The Signs
\[f = \sum_{i=1}^{n} i\]

Mean Girls
\[\frac{1}{n} \sum_{i=1}^{n} i\]

Green Mile
1609.344 Metres

Golden Eye
\[a + bi\]

Sum of All Fears
\[F = \{x : x \text{ is a fear}\}, \sum_{x \in F} x\]

13th Floor
[13]

Exorcist
\[x \vee \{ \text{cist}\}\]

Sin City

Social Network

Odd Couple
\[(2i + 1, 2j + 1)\]

Beauty & The Beast
\[e^{i\pi} + 1 = 0\]

Heat
\[\frac{\partial u}{\partial t} - \alpha \nabla^2 u = 0\]

Speed
\[\frac{ds}{dt}\]

Wall-E
2.7182818284590452…
What are different forms of e-learning?

• Respond at PollEv.com/padmanabhans848

• Text PADMANABHANS848 to 37607 once to join
E-Learning

• Computer Based Training or Computer-Aided Instruction
• On-line Learning
• Web-based Learning
• Technology Based Learning
• Technology Enhanced Learning
• Distance Learning
• Blended Learning
• ............
<table>
<thead>
<tr>
<th>Tools</th>
<th>Software</th>
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<tbody>
<tr>
<td>Blogging</td>
<td>Wordpress, Blogger, Serendipity, TypePad</td>
</tr>
<tr>
<td>Microblogging</td>
<td>Twitter</td>
</tr>
<tr>
<td>Wikis</td>
<td>PBWiki</td>
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<tr>
<td>Podcasting</td>
<td>Audacity, Garage Band, Vlog</td>
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<tr>
<td>Screen Capture &amp; Screen Casting</td>
<td>Jing, Screencast-o-matic, VoiceThread</td>
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<tr>
<td>Video hosting and Sharing</td>
<td>You Tube, Edthena</td>
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<tr>
<td>Presentation Sharing</td>
<td>Slideshare</td>
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<tr>
<td>Image hosting and sharing</td>
<td>Flickr, Picase</td>
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<tr>
<td>RSS reader</td>
<td>Google Reader</td>
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<tr>
<td>Creating Surveys</td>
<td>Polldaddy, Surveymonkey</td>
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<tr>
<td>Polling</td>
<td>Polleverywhere</td>
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<tr>
<td>Research</td>
<td>Instagrok, Dedoose</td>
</tr>
<tr>
<td>Concept Map</td>
<td>Popplet</td>
</tr>
<tr>
<td>Digital Stories</td>
<td>Storybird, Toondoo</td>
</tr>
<tr>
<td>Grading</td>
<td>Flubaroo</td>
</tr>
<tr>
<td>Language</td>
<td>Duolingo, Spelling City</td>
</tr>
<tr>
<td>Website</td>
<td>Pen.io, Wordpress, Wix</td>
</tr>
<tr>
<td>Print Websites</td>
<td>Printfriendly</td>
</tr>
</tbody>
</table>
Toondoo

http://www.toondoo.com/

Free online tool to make cartoons to excite kids, to make comic strips, to inject humor, to visualize

Creating a Cartoon Strip in ToonDoo
**MR JONES** - BY MRGPGILCHRIST

OMG! No one's here!

Mr Jones!!!

...and I'm getting in trouble for my attendance!!!

---

**FORCES** - BY MRGPGILCHRIST

ICH LIKE THIS........
NETWON'S Frist LOW:
F=MA

AT PARTIES, BILL WAS A FORCE TO BE RECONGIZED WITH
Popplet

http://www.popplet.com/

Popplet is a tool for the iPad and web to capture and organize your ideas.

It is a Concept Map maker, share with social networks
Differentiation of Instruction

*is a teacher’s response to learners’ needs*

guided by general principles of differentiation such as:

- respectful tasks
- flexible grouping
- ongoing assessment and adjustment

ways to differentiate:

- Content
- Process
- Product

according to students’

- Readiness
- Interests
- Learning Profile
The Learner Relationship

What Teachers Prepare

• Content
  -- Access

• Process
  -- Sense-making

• Product/
  Learning Artifacts
  -- Evidence

How Students Engage

✏️ Readiness
  -- Current Skill Level

✏️ Interests
  -- Choices and Backgrounds

✏️ Learning Profile
  -- Brain Intelligences
Embrace Student Differences

- Provide assistive and accessible tools
- Encourage students to create customized tools
Use Assessment Data to Guide Instruction

• Employ progress monitoring and diagnostic tools
• Facilitate students in tracking their own progress
• Interpret data to guide your future instruction
Use Choice to Engage and Motivate

- Provide an array of tools that captivate students’ interest
Offer Flexible Groupings

- Mix whole class orientations with small group and peer tasks
- Collaborate with groupings outside of the classroom
Expect a Variety of Products

- Utilize tools that allow students to express their creativity

- Encourage interaction and participation
Hands-on Exploration
Teacher Professional Development

\[ y = A \sin(\omega x - \phi) + b \]
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