Integrating Educational Technology into Medical Education

Process versus Product

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Objectives

1. Discuss the process of integrating technology into medical education
2. List common barriers to integrating technology and ways to overcome them
3. List at least one method to integrate technology into teaching
Why Tech Matters
“Digital native”

THE EVOLUTION OF MAN
Gen C is a state of mind

80% of Millennials

Creation
Curation
Connection
Community
understanding the data deluge: comparison of scale with physical objects

1 megabyte
(A large novel)

1 gigabyte
(Information in the human genome)

1 terabyte
(Annual world literature production)

1 petabyte
(All US academic research libraries)

1 exabyte
(Two thirds of annual production of information)

A tiny ant

Height of a short person

Length of the Auckland Harbour Bridge

Length of New Zealand

Diameter of the Sun
The Effect of Technology on Modern Education

Medical Student 1960

Medical Student 2018
“Today’s students are no longer the people our educational system was designed to teach.”

-Marc Prensky, Digital Natives, Digital Immigrants
Education in the Digital Age
I never teach my pupils; I only attempt to provide the conditions in which they can learn.
“[Metacognition is]…essential to foster deep and durable learning.”

Interactive teaching styles that facilitate reflection, self-assessment, and perspective-taking

Educational design is the creation of curriculum and instruction which optimizes an immersive learning environment

-Me
Educational technology

“...a process-oriented and systems-based pedagogical approach for facilitating learning and improving performance in patient care by the integrated mode of creating, using, and managing technological process and resources.”

Han, et. al. Teach and Learn in Med. 2013;25(S1):S39-
Discussion Time:

So we live in a digital world?

How do our trainees learn and how do they want to learn?
Why Don’t My Students Think I am Groovy? The 5 R’s For Engaging Millennial Learners

Christie Price-Dalton State U
Connected Faculty

1. Tech-Savvy:
2. Relevant:
3. Seriously Humorous.....
4. Relaxed and Relatable:
Relevance

What you want to say.

What they're interested in.

Relevance
Rationale
Relaxed
Research Based Active Learning
What Methods Do You Use to Teach?

http://vark-learn.com/the-vark-questionnaire/teaching-questionnaire/
**VISUAL**
I prefer to see information graphically through maps, charts, graphs, flow charts, labeled diagrams. I like to see meaningful symbols for relationships between different concepts. Please note, it does NOT include movies, videos, or PowerPoint.

- **Self Report:** 54%
- **VARK Assessment:** 54%

**AUDITORY**
I prefer to learn by hearing or speaking such as from lectures, books on tape, group discussion, talking to others. I want to sort out ideas by speaking them first. I may need to say something in my own way to learn it.

- **Self Report:** 21%
- **VARK Assessment:** 55%

**READ/WRITE**
I prefer to see information displayed as words. I like to learn by reading books and essays, watching PowerPoint, and completing written assignments. I often have to write something down to help learn it. Anything that involves reading or writing words (not diagrams).

- **Self Report:** 53%
- **VARK Assessment:** 60%

**KINESTHETIC**
I prefer to learn by experience and practice. In other words, I learn by doing (or seeing something be done). I like learning through demonstrations, simulations, case studies, and practical applications.

- **Self Report:** 51%
- **VARK Assessment:** 62%
Components of a 21st Century Classroom

Technology is undeniably changing the face of education, and it's easy to see the impact already. Imagine what classrooms will be in 20 years with the speed of technological innovation. Let's take a look at some of the key advancements in the 21st century classroom.

Top 3 Reasons for Teachers to Use Technology in the Classroom

- **76%**: Adapt to diverse learning styles
- **77%**: Boost student motivation
- **76%**: Enhance the material being taught

Increasing the presence of the following technologies could change that ratio drastically:

**1. Project-based Learning (PBL)**
   - PBL involves students in the learning process by integrating real-world projects and challenges.
   - It encourages critical thinking, collaboration, and creativity.

**2. Online Courses**
   - Over 63% of education institutions now offer online learning courses.
   - It provides flexibility for students who cannot attend traditional classes.
   - Online learning can accommodate diverse learning styles.

**3. Virtual Reality (VR)**
   - VR offers immersive learning experiences.
   - It can simulate environments that are difficult or impossible to recreate in a traditional classroom.

**4. Mobile Learning**
   - 59% of students now use their mobile devices to enhance learning.
   - Mobile learning can be accessed anytime, anywhere.

**5. Artificial Intelligence (AI)**
   - AI can personalize learning and provide immediate feedback.
   - It can help teachers monitor student progress and adapt instruction accordingly.

One system claims to predict whether a student's likelihood of sufficient source completion with about 70% accuracy. Highlighting risk factors for individual students.
What are Our Current Teaching Methods (aka How to Do It Better)
Evolution of ET

Use
Exposure
Facts

Delivery
Mastery
Concepts
Preparation and embracing technology
Integrating Educational Technology

1. Understand and embrace the technology
2. Add to an existing educational framework
3. Start slow and build slowly
4. Don’t be afraid to experiment and innovate
Embrace Technology
Cloud Storage
Become a hoarder
Establish a framework

Add the technology into an existing framework to enhance delivery or retention of information
The importance of educational theories for facilitating learning when using technology in medical education

JOHN SANDARS¹, RAKESH S. PATEL², POH SUN GOH³, PATRICIA K. KOKATAILO⁴ & NATALIE LAFFERTY⁵
1. Problem identification and general needs assessment

2. Targeted needs assessment

3. Goals and objectives

4. Educational strategies

5. Implementation/delivery

6. Evaluation and Feedback

Kern, et. al. 2009
Take your time...
Experiment and innovate
Adopt the beginner’s mind
Foster communication
...but recognize that it is just a tool
Simplicity
Success Stories
Educational Technology and Scholarship in the Digital Age
KEEP CALM. THERE'S AN APP FOR THAT
KEEP CALM AND GET OUT OF THE WAY
SAMR
**SUBSTITUTION**
Technology acts as a direct substitute, with no functional change.

**AUGMENTATION**
Tech acts as a direct substitute, with functional improvement.

**MODIFICATION**
Technology allows for significant task redesign.

**REDEFINITION**
Tech allows for the creation of new tasks.

**TRANSFORMATION**

**ENHANCEMENT**
SAMR and Bloom’s

Redefinition
Modification
Augmentation
Substitution

Evaluation
Synthesis
Analysis
Application
Comprehension
Knowledge
The SAMR Model for Technology Integration

SAMR

NO TECH

SUBSTITUTION
Tech acts as a direct tool substitute, with no functional change.

AUGMENTATION
Tech acts as a direct tool substitute, with functional improvement.

MODIFICATION
Tech allows for significant task redesign.

REDEFINITION
Tech allows for the creation of new tasks, previously inconceivable.

ENHANCEMENT

TRANSFORMATION
Substitution
Augmentation
Modification

“THE FLIPPED CLASSROOM”

Student watches video at home.

Team based learning exercise in classroom instead of didactic instruction.
Redefinition

Tech allows for creation of new tasks previously inconceivable.
<table>
<thead>
<tr>
<th>SAMR Worksheet</th>
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<tbody>
<tr>
<td><strong>Transformation</strong></td>
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<td>Redefinition</td>
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<td>Modification</td>
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<td>Augmentation</td>
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<tr>
<td>Substitution</td>
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Best Practices (Q&A)
Becoming paperless

Step 1: Mimic your paper system
Step 1: Mimic your paper system
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Step 1: Mimic your paper system
Written
Clinical Simulation Exam

Film, Analyze, Mirror, Present
LEAD

Lecture Enhanced Active Didactics
Move to the Lecture Enhanced Active Didactics

1. Make a shift in lecture content - No Lecture segment lasts more than 45 min
2. We increased our expectations and communicated that message
3. Active learning experiences every hour
4. Constructivist Classroom/Constructivist Bedside?
HOW: Constructivist

1. We engage learners using desirable difficulties
2. We allow their responses and their baseline knowledge help in tailoring the learning experiences
3. We build off of the initial learning experience or benchmark set by the initial desirable difficulty
4. Students reflect, process, and present with frequency
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