Technology-Enhanced Learning – What is it and how can we do it well?

Thoughts from a stranger in a strange land
17 March, 2011

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Orientations section is intended to provide common foundation and perspective that aligns with the work Ben, Stuart, and I are currently engaged.

Student Satisfaction 2.0 to deepen awareness of an opportunity to better integrate the student experience into online learning designs.

Learner Centered Tools for Online Learning is to provide exemplars to facilitate material development and supporting faculty for online learning environments.

Center for Distributed Learning at UCF is to provide context for how a large organization successfully manages Online Learning.

“What does 10 Years online experience tell us?” is to consider data collected over 10 years at UCF.
Orientations
How do we characterize?

What “technology”? 

Multimedia defined “…as presenting both words (such as spoken text or printed text) and pictures (such as illustrations, photos, animation, or video).”

“By words… material is presented in verbal form, such as using printed text…or spoken text.”

“By pictures…material is presented in pictorial form, such as using static graphics, including illustrations, graphs, diagrams, maps, or photos, or using dynamic graphics, including animation or video.” (2, p. 2)

(2) 
Delivery media view: requires 2 or more delivery devices (eg screens, speakers, projectors, etc) and a lecturer’s voice.

Presentation modes view: requires verbal and pictorial representations (eg on-screen text, animation, printed text, animations, etc).

Sensory modalities view: requires auditory and visual senses (eg narration, animation, lecture, slides, etc).
Is it more about arriving at an indication of “change”?

Differences between novice and expert


Characteristics: what are they? What could we use?
What do we do to ensure learning “happens”?

Suggest, advocate, guide, promote, collaborate, research, … on matters like:

- Assessments, objectives, instructional strategies, teaching principles, organized learning environments, research-based models, …
- Learning theories, Educational Psychology, Principles of Practice (or Best Practices), …

How are we guided for TEL?

Assessments, objectives, instructional strategies, teaching principles, organized learning environments, research-based models, …
What is the “modern” view?

- Media, or combinations of media, factor less on learning than does instructional design (6)

- Learners are becoming “…active participants in their learning experiences and are shaping their own educational environments” (6, p. 2)

- “Without knowledge of relevant aspects of human cognitive architecture… the effectiveness of instructional design is likely to be random” (7)

Beyond the scope of technology mediated learning is the rich base of literature focusing on learner experience:

(6)

(7)
Multimedia Learning: Underpinnings

Roots in Information Processing Model
- Encoding of stimuli, short-term / working memory, long-term memory (8)

3 Assumptions
- Dual-Channel (9)
- Limited Capacity (10)
- Active Processing (11)

Multimedia model of learning roots in information theory

3 assumptions
- Dual Channel: separate information processing channels for visually or auditorily represented material
- Limited Capacity: how much we can hold in working memory at any one time – the “chunking” principle
- Active Processing: construct coherent mental representation of experience

References:


We also need to address learner-centered vs teaching-centered.

Complexity of our work requires familiarization with the different approaches, their epistemological origins, their affordances and constraints.

Evangelizing a technology-centered or a teaching-centered design approach has the potential for long-term negative influences. “It is not the technology that defines the practice but the surrounding context” (Beetham & Oliver, 2010, p. 165). The risk involved is not developing digital literacy, as it is defined by Betham and Oliver:

- foundational capabilities – many skills are dependent upon foundation capabilities
- cultural entitlements without which learners are impoverished in relation to culturally valued knowledge
- representation involving culturally significant communications
- interpretation – internalizing public/shared knowledge
- opportunity for practice – continuous development and refinement in different contexts
- socially and culturally situated practices – highly dependent on context, and on actions and reactions of others
- self-transformation – literacies have a lifelong impact

(12)
Teaching principles provide indirect guides to successful student outcomes.

Student satisfaction provides direct evidence of student experience – this may influence outcomes...

Draw graphic:
- Top - Time line with numbers
- Below line – examples of events: Syllabus, Introductory lectures or initial assignments; Assignments, practices, ...; Assessments (scored, unscored, ...)
- Below event examples: Constructs of Aware, Challenge, Engage
  (instructional strategies include clarifying statements, motivational elements, ...; motivating, introducing situations that require mental effort, ...; acknowledge evidence of “learning”

- Below constructs: interweaving wave of motivation and cognition
- Below wave: examples of instructional design models or teaching principles or other grounded approaches or culturally induced approaches (from engineering to Buddhist...)

What is our target design model? Clarify please!

- Technology centered vs Teacher centered vs Learner centered
- Teaching design models and principles reflect indirect guides to student experience
- Student satisfaction can provide direct evidence of student experience
Student Satisfaction 2.0

My work
Some definitions:

A) Cognitive Load or Mental Effort: “The load imposed on working memory by information being presented” (Mayer, 2005, p. 28). Cognitive load can be said to be the non-automatic mental elaborations applied to information processing or learning (Clark, 1999; Feldon, 2007a, b; Salomon, 1983, 1984).


C) Satisfaction refers to a range of feelings, from positive to negative, about a learner’s accomplishments and learning experiences. These feelings are intrinsic in the individual learner, are associated with an outcome that is perceived by the individual to be fair, and are influenced by extrinsic rewards (i.e., the situative learning context) (Dubuc, 2009; Deci, 1975).

Information Processing Model elements:
- dual channel theory (visual sketch pad, the articulatory loop), dual processing theory (working memory vs automaticity), memory limitations (Miller’s 7+2 which became Cowan’s 4), active learning (paying attention, organizing incoming information, integrating incoming information with other knowledge)
- Cognitive Load Theory: Includes Essential, Extraneous, Representational Holding (Mayer) or Germane, Incidental, Intrinsic (Sweller) loads, are additive

Learner’s Goals:
- Cognitive Theory of Motivation by Edward Deci, 1975
  - From Deci’s model, satisfaction is (a) a component of motivation; (b) it is summative; but (c) it also represents an expectation for future rewards that serves to initiate or support cognitive behavior.
  - (Deci’s view is that rewards may be (a) extrinsic related to drives, (b) intrinsic related to feelings of competence and self-determination (efficacy), and (c) change in affect relating positively to initiative behaviors. This view is further modified to reflect ongoing behavior changes as part of a dynamic system.)

Context of Learning:
- Sloan Model by Dziuban et al. (2007) – see (14) below.
  - Researchers used a mixed methods research approach to explore student satisfaction within ALN environments. First, they took a quantitative approach by surveying 1,325 students across two campuses and ran a principal component analysis of the respondent data. Second, the team took a qualitative approach by convening multiple student focus groups to capture student perspectives. The derived results from each analysis were set into a table matrix to determine correspondence, which was better than 50%. The team identified eight dimensions that comprise student satisfaction.

A), B), C), (13), (14), (15), (16) – See final slide in presentation for cited references.
Analogy:
• In education, we’re all fishermen/ fisherpeople.
• We are the fishermen, students are the fish
• We all hope to catch the minds of our students
• As experienced fishermen, we know to carefully select the bait, hook, and how heavy line to use
• We know the best hours to catch, and the best spots
• And then we have to work it and work it and hope for a bite

Quote:
Comedian and actor Steven Wright sets us straight: “There's a fine line between fishing and just standing on the shore like an idiot.”

Our perspective as educators being like the fishermen, we know that the successful fishermen is the one who knows the fish we’re looking to catch. What Chuck and the team have done is to provide us tools to better learn and describe the fish we’re trying to catch.

We have 8 dimensions by which we can describe students’ perspectives on online course satisfaction. These dimensions can be thought of as a language by which to study student perceptions with this mode of teaching and learning. Following that line of thinking, we are exploring the terminology, syntax, and semantics of this language.

Providing a little more focus to these dimensions we have the following...
These are the themes behind each dimension. They are complex and they would seem in places to merge with each other. This would seem to be a function of semantics as we learn to better define the nature of these dimensions.

It is critical to note that these themes represent the student viewpoint, not an instructor’s.

See handout “Table - Sloan Model & Chickering and Gamson.docx”
After finding the correlation, further analytics were conducted. One was...

- Factor analysis procedure was Principal Components Analysis and Image Analysis
- Used Promax rotation - optimal strategy use an oblique rotation to find a best fit for the sample data

The identification of three emergent factors required these steps:
- Generated a Scree Plot to identify key factor count – 3 before data points became undistinguishimg
- Analysis redone to extract items for first 3 factors
- From the extracted items, selected items with .4 value or greater
- Reviewed the results to identify the nature the grouped items

**Awareness:** becoming aware of criteria for success in an online course
- Being able to track progress, access to clear instructions, finding answers, and having multiple due dates for assignments
- Shows students adjusting strategies and priorities for learning from performance in tact with course requirements
- Adjustments originate from awareness of course conditions and individual performance

**Challenge:** definition of challenge or the degree of effort to complete course requirements
- Two cognitive load items balance effort with preparation for effort (presentation requiring high memory and being trained to manage high memory presentations)
- Including extra material and being able to push beyond required levels of performance on assignments reflect challenge
- Three goals-rewards items tie satisfaction levels with challenge

**Engagement:** elements to support engagement
- Varieties of communication forms, such as peer to peer, active discussions or debates, and with the instructor, reflect common ways students perceive engagement in a course
- Course relevancy (to major), assignment options, and opportunities to select among assignment options shows engagement through goal seeking and taking ownership of work
- Needing motivation to encourage participation fits the concept of engagement
Student satisfaction data can be used to advise instructional design, which in turn advises on the use of multimedia.
Learner Centered Tools for Online Learning

Some Additional Resources (Developed and Used at UCF)
Bloom’s (revised) Wheel

- Circle invokes sense of continued development
- IDs work from inside out / Domain experts all-at-once
- Fill it in / Explore on reverse

See handout “Bloom’s Revised Taxonomy.pdf”
Technology selected to support objectives and assessments

- Simultaneous presentation of instructional design elements
- Ensure alignment between elements
- Facilitate discussion

See handout "Bradford_Chen_Developing Strategies for Online Learning_2007.pdf"
This second IDL6543 e-mail, along with the initial e-mail you received earlier, are examples of your instructor(s) beginning to establish “swift trust” in the online course you are about to begin. Coppola, Hiltz & Rotter (2004) associated “swift trust” with student success in online courses and embody a relationship-building concept. “Swift trust” is an idea you might want to consider as you begin this exploration of the online teaching arena.

Integrating teaching philosophy with your online persona

- Instructional unit for faculty to develop their online persona
- Integrate best practices with social presence
- Based on the dissertation by W.O. Phillips, UCF

See handouts “Bradford_Face_to_face_unit_plan-Persona_2010.pdf” and “Bradford_Introducing_Your_Online_Persona_2010.pdf”

(18)
Extended student satisfaction instrument

⚠️ Being reworked... Check back soon.
Faculty Readiness Assessment

- Identify relevant experience designing and developing online learning materials
- Designed to evolve as technology and skill requirements evolve
- Developed in Excel – Needs to be Web2.0

Get most recent version from mini or extra drive
Grading with Rubrics in Large Classes

- Develop rubrics
- Grade quickly
- Individuals or groups
- Produce HTML results
Center for Distributed Learning at UCF

Who, What, How
### UCF: By the numbers (1 of 2)

#### Sections & Registrations

- **Modality:**
  - 0: Fully online
  - 1: Reduced seat time (Blended)
  - 2: Interactive video at select UCF instructional sites
  - 3: Pre-recorded video available via broadband internet
- **Terms:**
  - Spring 2008
  - Summer 2008
  - Fall 2008
  - Spring 2009
  - Summer 2009
  - Fall 2009
  - Spring 2010
  - Summer 2010
  - Fall 2010

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**注**: Reporting database for any IESI trial Institutional Research. Registrations include funded and non-funded enrollment activities.


http://dl.ucf.edu/research/data-statistics/
UCF: By the numbers (2 of 2)

Productivity Charts

See http://dl.ucf.edu/research/data-statistics/

http://dl.ucf.edu/research/data-statistics/
Who are being taught and who is teaching?

**Faculty**
- Gen X: 33%
- Millennial: 1%
- Mature: 11%

- Baby Boomer: 55%

N=689

**Student**
- Gen X: 11%
- Millennial: 84%
- Mature: 1%
- Baby Boomer: 6%

N=26,823
UCF Faculty Development Model

- To develop online courses at UCF, must complete IDL6543 or be released of requirement by CDL
- IDL6543 is 8 week staff development program, blended format
- Offered 3 times / yr, 80-90 faculty / yr
- For original course outline, see handout “IDL6543 Overview.htm”
- Alternative Faculty development options, see handout “CDL Pathways to online teaching and learning.pdf”
Center for Distributed Learning @ UCF

- Advanced Systems
- Tech Rangers
- New Media
- Digital Media
- Level2 Productions
- Instructional Design
- Instructional Design Assistants
- Administrative Team

60-75 full and part-time staff
Instructional Design Development Team

Instructional Design Team
- 11 Full Time Staff
- 3 Doctors, Rest have M.A.s
- All provided with modern laptops

4 Instructional Design Assistants
- 1 full time, 3 part time
- Graduates, most working on M.A.s
What does 10 Years online experience tell us?

10 Years of Data Collection @ UCF
A decision rule for the probability of faculty member receiving an overall rating of *Excellent* (n=1,280,890)

**If...**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
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<td>Facilitation of learning</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Communication of ideas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Respect and concern for students</td>
<td>0</td>
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<td>0</td>
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</tr>
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</table>

**Then...**

The probability of an overall rating of *Excellent* = .97 &

The probability of an overall rating of *Fair* or *Poor* = .00
A comparison of excellent ratings by college unadjusted and adjusted for instructors satisfying Rule 1 (n=1,280,890)

<table>
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<tr>
<th>College</th>
<th>Overall % Excellent</th>
<th>If Rule 1 % Excellent</th>
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<tbody>
<tr>
<td>Education</td>
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<td>97.9</td>
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<tr>
<td>Molecular &amp; Microbiology</td>
<td>49.9</td>
<td>97.6</td>
</tr>
<tr>
<td>Health &amp; Public Affairs</td>
<td>49.8</td>
<td>97.6</td>
</tr>
<tr>
<td>Arts &amp; Humanities</td>
<td>49.1</td>
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<td>Arts &amp; Sciences</td>
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<td>Sciences</td>
<td>44.5</td>
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<td>Hospitality Management</td>
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<tr>
<td>Business Administration</td>
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<tr>
<td>Engineering</td>
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</table>
What do you think?
Current Activities

- eP – Training & Rollout
- Workshops
- Ben, Stuart, care to add?
- …
Where do you want to contribute?
Show of hands, Who “groks” this presentation?
References

See the notes section for each slide to find the cited references.
• Null hypothesis
• After exploring the topic of satisfaction in online learning for 2 years, identified an untapped area that led to this statement
• Question leads to instructional design effectiveness with learning online and
• How design effectiveness might be expressed by student satisfaction

• Differences of student perspectives with learning:
  • Some good, some not, some find learning easy, others not
  • Some respond to challenging topics, others are ambivalent, still others react negatively

• Bottom line: learning is an individual experience
• Underscores focus on the student perspective to best achieve objectives

• Long distrust that standard satisfaction surveys really tell the whole story
• Kirkpatrick’s 4 Level Evaluation Model + Level 1 <> Level 2: “Liking is not learning”
Null hypothesis is rejected – the correlation shows there exists a relationship

There is a problem with the low alpha value for the cognitive load construct – the potential is there can be different interpretations occurring

However, the finding that cognitive load is related to satisfaction elevates how administrators, instructors, and instructional designers should consider reports on student satisfaction

To this point, there has not been found a connection between motivation and cognition - such a finding should spur further research activity – this is quite exciting
Need to look into the connection between the relationship of satisfaction-cognitive load and performance – does this relationship correlate with learning?

The cognitive load scale had the lowest reliability – need to look at semantics, consider adjustments, and then explore specific elements within the scale. For example, focus on scenario type five, where representational holding plays a role with essential processing.

Learn more about the intrinsic complexity of learning materials will be useful in designing effective instructional strategies for difficult topics.

Need to conduct the study across multiple institutions – determine whether the findings will hold, are stable.

Need to apply the study into specific disciplines, such as math, sciences to learn more about the relationship within those environments.

Business environments reflect a large opportunity for further research.
Some characteristics of the generations

- **Matures (prior to 1946)**
  - Dedicated to a job they take on
  - Respectful of authority
  - Place duty before pleasure

- **Baby boomers (1946-1964)**
  - Live to work
  - Generally optimistic
  - Influence on policy & products

- **Generation X (1965-1980)**
  - Work to live
  - Clear & consistent expectations
  - Value contributing to the whole

- **Millennials (1981-1994)**
  - Live in the moment
  - Expect immediacy of technology
  - Earn money for immediate consumption
Approximately 26 years ago, Keller (1983) developed his motivational design model, which he grounded in theories of expectancy-value (DeCharms, 1968), reinforcement (Travers, 1977), and cognitive evaluation (Deci, 1975; Keller, 2006). Keller integrated these theories by using systems analysis to explain the context of the relationships between effort, performance, and satisfaction. The four categories of motivational variables are attention, relevance, confidence, and satisfaction, and from these Keller formed the acronym ARCS. The model includes a systematic, seven-step approach to embed motivational strategies into instruction (Keller, 1999).

Recent empirical studies of the model confirm the model’s validity (Huang, Huang, Diefes-Dux, & Imbrie, 2006; Keller & Suzuki, 2004).

(18)

(19)
For definitions:


