Research in Design and Development

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Introduction

e-Learning

- Research
- Design
- Development

- What is the nexus of these three activities?
- How and why should they intersect?
State of e-Learning

Research

- Few empirical studies
- Reliance on heuristics
- Focus on the “science” of learning
- Research to practice gap
  - Corporate, industry, military, education
Design
- Rediscovering the value of design
- Broadening of definition
- Messy, chaotic problem solving
- Creative, inductive process
- Emerging, interdisciplinary perspectives
State of e-Learning

Development

- Rapid prototyping and efficiency
- Innovation development cycles
- Workflow, work process
- Increase productivity, learning and performance
- Affordances of current technologies
Future of e-Learning?

• What if we could…?
  – generate new knowledge about learning and performance while engaged in e-Learning design and development?
  – codify e-Learning design knowledge (principles and processes) to inform future design?
  – learn from what worked and more importantly, what did not work in e-Learning development to improve processes and workflow?
Design Research

• Historical and emerging definitions

  • “…engineer innovative educational environments and simultaneously conduct experimental studies of those innovations” (Brown, 1992, p.141).

  • “…theory-driven process of designing and a data-driven process of refining instructional strategies to produce explanatory models of how we come to understand (NRC, 2002; p. 122)”.
e-Learning Design Research

- Characteristics of design research
  - Theoretically-based
  - Participatory
  - Iterative
  - Generative
  - Transformative
  - Analytical
  - Adaptive
  - Takes advantage of messy, ill-structured, ambiguous nature of design to investigate phenomena related to learning and performance

A Model for Design Research

• Integrative Learning Design Framework
  – Blending of systematic processes from multiple design fields
    • Instructional systems design
    • Product design
    • Usage-centered design
    • Innovation design and development
  – And educational research processes
• Identifying the gaps in these processes as well as their commonalities to produce an integrated model
Example of Design Research

- Literacy AccessOnline (LAO)
  - Web-based environment
  - Provides performance support for literacy facilitators (teachers, parents, tutors, etc.) and children
  - To improve tutoring techniques and literacy activity performance (reading and writing)
  - Providing research-based reading strategy and assistive technology support
  - While engaged in the collaborative reading process
A Model of Design Research

• Informed Exploration
  – Identify need, opportunity, context
  – Locate related literature
  – What do others think is going on in learning/performance? (available theory)
  – If ideas are not readily available, what do you think is going on or influencing learning and performance? (generated theory)
  – Investigate and characterize end-users to focus design (role models, personas)
  – Make initial theory explicit and document
Informed Exploration Phase of LAO

• Research Question
  – What are best practices and technology support opportunities in literacy acquisition for 4th-8th grade students with or without learning disabilities?

• Research/Applied Methods
  – Benchmarking of related commercial products
  – Needs Analysis/Literature review
  – Performance analysis
  – Interviews
  – Literature review
  – Focus groups
  – Survey of experts
  – Observations of target audience members engaged in task
A Model of Design Research

• Enactment
  – Synthesize information from informed exploration
  – Translate specific, explicit ideas of how people learn/perform to system design
  – Document design principles (translated, embedded theory)
  – Identify intriguing relationships or “researchable” ideas of interest
  – Involve users in emergent design (participatory design)
Enactment Phase of LAO

• Research Question
  – Does the design reflect consistent, performance support for both literacy facilitator and child that promotes collaborative engagement in high level literacy activities?

• Research/Applied Methods
  – Task analysis
  – Usage-centered design
  – Designer log (project site)
  – Expert review
  – Multiple, participatory design sessions with targeted users and design reviews
A Model of Design Research

• Local Impact
  – Conduct iterative, formative cycles of investigation and design in local contexts
  – Remain open to the unexpected
  – Data-driven revision and documented decision-making (what worked/what didn’t)
  – Refine design principles and system
  – Gather information about users and needs during development cycles (proto-diffusion)
  – Determine how the design and principles (theory) should evolve and change based on user input and engagement with design
Local Impact Phase of LAO

- **Research Question**
  - How do literacy facilitators and children perceive and interact with Web-based support in the collaborative literacy process?

- **Research/Applied Methods**
  - Usability testing
  - Expert reviews
  - Observation/video records
  - Interviews
  - Qualitative studies
  - Quasi-experimental studies
A Model of Design Research

• Broader Impact
  – Investigate how and why users adopt the design or do not adopt
  – Attend to how the design is actually used, adapted or modified by the user
  – Attend to how the design diffuses or does not diffuse through an organization (social networks)
  – Publicize findings across phases
  – Broaden traditional dissemination outlets beyond academic and trade publication
    • Project sites
    • Design knowledge repository
Broad Impact Phase of LAO

• Potential Research Questions
  – How do facilitators and children actually use LAO?
  – What is the perceived “fit” of LAO in the specific organization?

• Potential Research/Applied Methods
  – Analysis of computer logs of activity
  – Multi-site interviews
  – Surveys
  – Observations
  – Data mining
e-Learning Design Research

• Potential to:
  – Generate new knowledge about learning & performance
    • Research-to-practice connections
    • Practice-to-research connections
  – Produce and test design principles (enacted theory)
    • To inform other design efforts
  – Meta-design
    • To articulate and investigate processes of design and development
  – Prevent information loss in design
    • Design process offers multiple opportunities to learn about learning and performance
e-Learning Design Research

• New Perspectives on Research
  – Emphasizing connections between research, design and development

  • "Directly witnessing and experiencing aspects of behavior in the real world is a proven way of inspiring and informing [new] ideas. The insights that emerge from careful observation of people's behavior . . . uncover all kinds of opportunities that were not previously evident."

    » Jane Fulton Suri (2005)
New perspectives on Design

- Thinking about learning and performance through design

“Design thinking is inherently a prototyping process. Once you spot a promising idea, you build it. The prototype is typically a drawing, model, or film that describes a product, system, or service. We build these models very quickly; they're rough, ready, and not at all elegant, but they work.

- The goal isn't to create a close approximation of the finished product or process; the goal is to elicit feedback that helps us work through the problem we're trying to solve.

- In a sense, we build to think.”

» Tim Brown (2005)
e-Learning Design Research

- New perspectives on Development
  - Generate knowledge about design and development processes to boost productivity

- Organizations need to take design thinking seriously. We need to spend more time making people conscious of design thinking -- not because design is wondrous or magical, but simply because by focusing on it, we'll make it better. And that's an imperative for any business, because design thinking is indisputably a catalyst for innovation and productivity

  » Tim Brown, 2005
e-Learning Design Research

• Needs:
  – Capitalize on affordances of technology to:
    • Create design process models – that support efficient and effective design documentation
    • Codify design principles and applied/basic research results for others benefit
    • Capitalize on the successes and failures of particular designs and design approaches
    • Apply workflow, KM and design research processes to the e-Learning community of practice
    • Shareable, collaborative, e-Learning designs
      – Improve our knowledge of learning & performance
Recommended Readings


