



## CENTER FOR TEXTUAL STUDIES AND DIGITAL HUMANITIES

DIGH 402 - Instructional Design and e-Learning

Spring Semester 2015

Week 10 - Extra

## Learning practice

Practice in e-Learning - intro and formats

- selection, organisation, integration, and retrieval of new knowledge
- 'interactions' in computer learning environments
- familiar classroom formats
  - selecting correct answer in a list...
- computer based formats
  - simulations, whiteboard marking...

## Learning practice

### Practice in e-Learning - effectiveness

- psychological effectiveness of practice exercise compared to its format
- consider difference in multiple choice questions
  - recognition of a definition to select correct option
  - application of a concept to select the correct option
- different levels of testing and practice
  - tests shallow and deeper understanding of concepts

## Learning practice

### Practice in e-Learning - evidential paradox

- importance of practice to the acquisition of skill

- Slobada, J.A., Davidson, J.W., Howe, M.J.A., and Moore, D.G. 1996 "The role of practice in the development of performing musicians." *British Journal of Psychology* 87. PP.287-309.

"There was a very strong relationship between musical achievement and the amount of formal practice undertaken." P.287.

- Plant, E.A., Ericsson, K.A., Hill, L., and Asberg, K. 2005. "Why study time does not predict grade point average across college students: Implications of deliberate practice for academic performance." *Contemporary Educational Psychology* 30. PP.96-116.

- Ericsson, K.A. 2006. "The influence of experience and deliberate practice on the development of superior expert performance." *The Cambridge handbook of expertise and expert performance*. Cambridge University Press.

## Learning practice

### Practice in e-Learning - evidential paradox (part 2)

- factors differentiating practice
- practice leading to expertise or not
- 'deliberate practice'
  - Ericsson. 2006. P.692.
- maximise benefit of practice with some recommended factors
  - practice that focuses on specific skill gaps
  - explanatory corrective feedback
  - practice in distraction-free environments
  - practice that builds transferable skills (learning to work...)
- a few principles to consider
  - mirror realistic context
  - practice relative to requirements and an even distribution throughout the learning
  - multimedia principles for design of practice questions
  - transition from examples to practice via fading

## Learning practice

Practice - mirror realistic context

- learners respond in a related realistic context
- analysis of the context and task being taught
- helps define specific cognitive and physical processing in the given environment
- transfer appropriate interactions
- cues of transfer encoded at the time of learning
- right cues need to be encoded into long-term memory
- create designs to encourage implanting of cues needed for retrieval for a given task
- remember how learners will apply new knowledge in the given context or task

## Learning practice

<i>Content Type</i>	<i>Interaction Description</i>	<i>Example: Web-Page Creation</i>
Fact	Use the fact to complete a task; provide a job aid for memory support	Use the codes on your reference aid to access the application
Concept	Identify a new instance of the concept	Select the web page that applies effective text design features
Process	Solve a problem or make a decision	Predict the impact of a miscoded page property specification on the final web page output
Procedure	Perform a task by following steps	Enter text specifications into the text properties screen
Principle	Perform a task by applying guidelines	Design an effective web page

Clark, R.C. 2007. "Developing technical training." Pfeiffer

## Learning practice

Practice - explanatory feedback

- provides knowledge of practice results
- instant feedback for user's answer
- explanatory feedback helps the learner build the correct mental model
- opportunity to remove lingering misconceptions
- implementing explanatory feedback more labour intensive than corrective feedback



## Learning practice

Practice - evidential benefits of explanatory feedback

- Moreno, R. 2004. "Decreasing cognitive load for novice students: Effects of explanatory versus corrective feedback in discovery-based multimedia." *Instructional Science* 32. PP. 99-113.
- Moreno, R., and Mayer, R.E. 2005. "Role of guidance, reflection, and interactivity in an agent-based multimedia game." *Journal of Educational Psychology* 97. PP.117-128.
- Debowski, S., Wood, R.E., and Bandura, A. 2001. "Impact of guided exploration and enactive exploration on self-regulatory mechanisms and information acquisition through electronic search." *Journal of Applied Psychology* 86. PP.1129-1141.

## Learning practice

Practice - a few suggestions...

- after a learner's answer, provide text feedback whether right or wrong and a succinct explanation
- maintain design contiguity
  - position feedback, question, and learner's answer in close physical approximation
- for multiple responses show correct answers next to learner's response and include an explanation

## Learning practice

Practice - multimedia principles

- multimedia principles to consider for design of practice
  - modality and redundancy principles
  - contiguity principle
  - coherence principle

## Learning practice

Practice - modality and redundancy principles

- modality principle suggests that audio should be used to explain visuals...
- audio is often too impermanent for practice exercises
- learners need to refer to directions while answering questions
- instructions and other information important to answering a question should remain as on-screen text
- feedback should also be presented in text
  - learners can review explanations at their own pace
- consider redundancy principle
  - text should be used alone for most situations in practice exercises
- not necessary to narrate on-screen text directions, practice questions, or feedback

## Learning practice

### Practice - contiguity principle

- contiguity principle suggests text should be closely aligned to the appropriate graphics
- contiguity principle particularly applicable to the design of practice questions
- clearly distinguish response areas
  - placement, colour, font...
  - place them adjacent to the question
- leave an open screen area for feedback near the question...
- learners should be able to align the feedback to their responses and the questions
- multiple choice marking of correct options as part of the feedback
  - use colour or easily identifiable marker
- carefully consider design layout for longer practice questions

## Learning practice

### Practice - coherence principle

- violation of the coherence principle imposes extraneous cognitive load
- consider excluding stories, background music and sounds, and detailed textual descriptions unless absolutely necessary
- examine design elements for impact on cognitive load
- practice exercises should be free of extraneous elements
- correlation between the amount of deliberate practice and grades
  - Plant, E.A., Ericsson, K.A., Hill, L., and Asberg, K. 2005. "Why study time does not predict grade point average across college students Implications of deliberate practice for academic performance." Contemporary Educational Psychology 30. PP.96-116.
  - Kenz, I., Hugge, S. 2002. "Irrelevant speech and indoor lighting: Effects of cognitive performance and self-reported affect." Applied Cognitive Psychology 15. PP.709-718.

## Learning practice

Practice - transition from examples to practice

- practices exercises can impose a high mental load on learners
- consider combination of worked examples alongside practice exercises
- faded worked examples to impose load gradually on learners
  - adjust fade relative to expertise level
- worked examples help speed up learning and improve learning outcomes
- a learner will use limited working memory capacity to build a mental model
- gradual shift in balance and work load
  - learners can invest more mental effort after initial mental model