GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT
Division of Learning Technologies
EDIT 802 (3 credits)
Cognition and Technology: A Multidisciplinary Approach
Fall 2012
Mondays 4:30-7:10 pm
Thompson Hall, Room L028

Professor: Dr. Nada Dabbagh
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PREREQUISITES: Completion of LTDR specialization area or equivalent

COURSE DESCRIPTION:

This course examines learning interactions between cognition and technology using multiple disciplinary perspectives including, cognitive science, psychology, neuroscience, education, design theory, instructional design, technology design, anthropology, sociology, information science, philosophy, semiotics, linguistics and other applicable fields.

COURSE GOALS:

The course focuses on the multidisciplinary exploration of cognition and technology. Although, central to doctoral study in Learning Technologies Design Research (LTDR), students from other doctoral programs including education, computer science, psychology, philosophy, sociology, and anthropology are encouraged to participate. The course is designed to provide an opportunity for doctoral students to investigate and discuss the multiple learning sciences disciplines that guide our understanding of human learning and cognition.

NATURE OF COURSE DELIVERY:

The class format is a mixture of lectures, discussions, and group activities. Course delivery is both face-to-face and online (approximately 60-40%). Students will share multidisciplinary perspectives through in-class and online discussion/blogs of readings, conduct research on the affordances of technology supported learning environments, contribute to an online knowledge base, and work collaboratively on interdisciplinary projects. Special emphasis may be placed on a specific learning sciences discipline in a particular semester. Such emphasis will depend on the individual student or instructor's research area or collective interests. An LMS and/or a wiki will be used to generate course content and document student learning and contributions.

LEARNER OUTCOMES:

This course is designed to enable students to:

- Understand the multidisciplinary nature of human learning and cognition and its impact on the design of learning technologies
- Examine the interactions between technology and cognition and the learning and cognitive affordances that this interaction enables
- Examine the cognitive, social, and technological aspects of learning
- Demonstrate thorough knowledge of the cognitive, socio-cognitive, and socio-cultural approaches to human learning and cognition and their impact on technology
- Understand how meaning is constructed, shared, internalized, and mediated through each of the perspectives examined
- Define and assess learning in each of the different approaches or perspectives that underlie human learning and cognition
- Analyze a variety of technology supported learning environments to determine the demands they place on human learning and cognition and the ways in which the human cognitive system responds in these environments
- Improve formal and informal learning environments in virtual and physical settings by generating design principles based on the theories examined

PROFESSIONAL STANDARDS:

This course adheres to the following Instructional Technology Program Goals and Standards for Programs in Educational Communications and Instructional Technologies established by the Association of Educational Communication and Technologies (AECT) under the National Council for the Accreditation of Teacher Education (NCATE).

Standard 1 – Design

1.1.b Identify theories from which a variety of instructional design models are derived and the consequent implications.
1.1.2.a Demonstrate in-depth synthesis and evaluation of the theoretical constructs and research methodologies related to instructional design as applied in multiple contexts.
1.1.3.b Utilize the research, theoretical, and practitioner foundations of the field in the development of instructional materials.
1.1.4.a Conduct basic and applied research related to technology integration and implementation.
1.1.5.c Articulate the relationship within the discipline among theory, research, and practice as well as the interrelationships among people, processes, and devices.
1.3.a Identify multiple instructional strategy models and demonstrate appropriate contextualized application within practice and field experiences.

REQUIRED TEXTS:

Theoretical Foundations of Learning Environments (Jonassen & Land, Editors), **second edition**, 2012, ISBN-10: **0415894220** | ISBN-13: **978-0415894227**

The Design of Everyday Things, Donald Norman, 2002 edition, ISBN-10: 0-465-06710-7/ISBN-13: 978-0-465-06710-7

Designs for Learning Environments of the Future: International Perspectives from the Learning Sciences (Jacobson and Reinmann, Editors), Publication Date: **February 19, 2010** | ISBN-10: **0387882782** | ISBN-13: **978-0387882789** | Edition: **1st Edition.**

OPTIONAL TEXTS:

Bransford, J. D., Brown. A. L., and Cocking, R. R. (2000). *How People Learn: Brain, Mind, Experience, and School (Expanded Edition).* Washington, DC: National Academy Press. Also available at: http://www.nap.edu/books/0309070368/html/index.html (see course website for additional options to access this resource)

Classic Articles (see course website for links):

Thagard, P. (1996). *Mind: Introduction to cognitive science* (Ch.1, pp.3-21). Cambridge, MA: MIT Press.

Rumelhart, D.E. (1980). Schemata: The building blocks of cognition. In R.J. Spiro, B.C. Bruce and W.F. Brewer (Ed.), *Theoretical issues in reading comprehension* (pp. 33-58), Hillsdale, NJ: Lawrence Erlbaum.

Greeno, J., Collins, A., Resnick, L. (1996). Cognition and Learning. D. Berliner and R. Calfee (eds.). *Handbook of Educational Psychology*. New York, Macmillan.

Affordance-Based Design (see course website for links):

Bower, M. (2008). Affordance analysis – matching learning tasks with learning technologies. *Educational Media International, 45*(1), 3-15.

Hartson, H. (2003). Cognitive, physical, sensory, and functional affordances in interaction design. *Behaviour & Information Technology*, 22(5), 315-338.

Gaver, W.W. (1991). Technology Affordances. *CHI '91 Proceedings of the SIGCHI conference on Human factors in computing systems: Reaching through technology.* New Orleans, USA.

Additional articles are available on the course website. Students are encouraged to contribute additional articles to help build the knowledge base of this course.

COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENT, AND EVALUATION CRITERIA:

A. Requirements: There are three main requirements in this course: (1) in-class and online participation and contributions (30% of grade); (2) analysis and development of the cognitive affordances of a learning technology (30% of grade); and (3) analysis of the cognitive affordances of a technology-supported learning environment (40% of grade). These requirements are described in detail below.

(1) Class Participation and Contributions (30%): Effective class participation involves not only preparation and communication skills, but also listening skills, contributing to the online knowledge base and commenting on peers' contributions both in-class and online. Specifically, students must make significant contributions towards building a shared interpretation of the readings and theories being discussed individually and collaboratively. This includes participation in class discussion and in critical analysis of the readings. Students are also expected to contribute analytic comments on the readings throughout the semester using a blogging platform (e.g., WordPress) or discussion forum as assigned.

(2) Cognitive Affordances Analysis of Learning Technologies (30%): In small teams students will select a learning technology, medium, or platform, critically examine the cognitive (learning) affordances of this technology, and develop related cognitive criteria appropriately grounded in the principles of cognition. The goal is to use these criteria to analyze the cognitive affordances of a **T**echnology **S**upported **L**earning **E**nvironment (**TSLE**).

(3) Cognitive Affordances Analysis of a TSLE (40%): Students will select an existing TSLE developed by cognitive scientists (the readings are a good source for this) or a TSLE known to or experienced by the student and will use the criteria developed in assignment #2 above to analyze the cognitive affordances of the TSLE resulting in a comprehensive analytical review of the TSLE and the provision of substantiated recommendations for improving the design of the TSLE. The analysis should include: (a) a brief introduction to the analysis, (b) description of the TSLE, (c) description of the technologies used in the TSLE, (d) description of the analysis process, (e) description of the results, and (f) conclusions and recommendations.

B. Performance-based assessments: The course includes 3 performance-based assessments (PBA) as described in the requirements section above.

C. Criteria for evaluation (includes rubrics and assessments):

Participation rubric for both in-class and online participation and contributions (30%):

- *Outstanding contributor*: contributions reflect exceptional preparation. Ideas offered are always substantive, providing one or more major insights as well as direction for the class. Frequent references are made to the readings and/or to knowledge from other sources, often showing the ability to generalize or extend the material under discussion. If this person were not a member of the class, the quality of discussion and knowledge building would be diminished markedly.

- *Good contributor*: contributions reflect thorough preparation. Ideas offered are usually substantive, providing good insights and sometimes direction for the class. Occasional references are made to the readings and/or to knowledge from other sources, sometimes showing the ability to generalize or extend the material under discussion. If this person were not a member of the class, the quality of discussion would be diminished.

- *Adequate contributor*: contributions reflect satisfactory preparation. Ideas offered are sometimes substantive, providing some useful insights but seldom offer new direction for the discussion. Some references are made to the readings and/or to knowledge from other sources but seldom generalize or extend the material under discussion. If this person were not a member of the class, the quality of discussion would be diminished somewhat.

- *Unsatisfactory contributor*: Contributions reflect inadequate preparation and/or there is little contributions in class or online. Ideas offered are seldom substantive, providing few insights and no direction for the class. References to readings are rare or non-existent. If this person were not a member of the class, the quality of discussion and knowledge building would be unchanged.

Point assessment for class participation (30%):

	Category 1	**Category 2**	**Category 3**	**Category 4**
CRITERIA	Unsatisfactory Contributor	Adequate Contributor	Good Contributor	Outstanding Contributor
In-class participation	5-6	7	8	9-10
Weblogs/ Peer critique	5-6	7	8	9-10
Online Discussion	5-6	7	8	9-10
Score	**15-20**	**21-23**	**24-26**	**27-30**

Rubric for cognitive affordances analysis of a learning technology (30%):

	Category 1	**Category 2**	**Category 3**
Criteria	**Unsatisfactory Analysis**	**Good Analysis**	**Excellent Analysis**
Cognitive affordances of selected technology are comprehensive, reflective of the selected technology, and grounded in cognitive science	5-6	7-8	9-10
Contributions to the knowledge base are ongoing, collaborative, and demonstrate critical analysis of the learning technology	5-6	7-8	9-10
Presentation is effective, collaborative, and invites peer feedback	5-6	7-8	9-10
SCORE			**27-30**

Rubric for cognitive affordances analysis of a TSLE (40%):

	Category 1	Category 2	Category 3
Criteria	**Unsatisfactory Analysis**	**Good Analysis**	**Excellent Analysis**
All components of the analysis are substantively addressed	5-6	7-8	9-10
Cognitive affordances criteria are used to analyze the TSLE, analysis process is clearly documented	5-6	7-8	9-10
Results of the cognitive analysis are clearly documented and used to provide recommendations for improving the design of the TSLE	5-6	7-8	9-10
Evidence of team collaboration on every aspect of this analysis	5-6	7-8	9-10
SCORE			**36-40**

D. Grading scale: A = 94-100; A - = 90-93; B+ = 86-89; B = 83-85; B- = 80-82; C = 70-79; F = <70

GMU POLICIES AND RESOURES FOR STUDENTS

a. Students must adhere to the guidelines of the George Mason University Honor Code [See **http://academicintegrity.gmu.edu/honorcode/**].

b. Students must follow the university policy for Responsible Use of Computing [See **http://universitypolicy.gmu.edu/1301gen.html**].

c. Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.

d. The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See **http://caps.gmu.edu/**].

e. Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See **http://ods.gmu.edu/**].

f. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

g. The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See **http://writingcenter.gmu.edu/**].

PROFESSIONAL DISPOSITIONS
Students are expected to exhibit professional behaviors and dispositions at all times.

CORE VALUES COMMITMENT
The College of Education & Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles. **http://cehd.gmu.edu/values/**

For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See **http://gse.gmu.edu/**].

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PROPOSED CLASS SCHEDULE

Date	Topics/Activities/Assignments/Due Dates	Readings for Next Class
Week 1 Aug. 27 **F2F**	Intro to course Setup individual blog on course LMS or WordPress	• Thagard, P. (1996). *Mind: Introduction to cognitive science* (online) • Greeno (1994) (online)
Week 2 Sept. 3 **Labor Day** **No Class**	Affordances ***Blog contribution based on week 1 readings due <u>Wednesday Sept. 5</u>, use themes to organize blogs***	• The Design of Everyday Things (textbook) • Gaver, W.W. (1991). Technology Affordances (online)
Week 3 Sept. 10 **F2F**	Affordances ***Select a learning technology (LT) for analysis*** Discuss week 2 readings	• The Design of Everyday Things (textbook) • Bower, M. (2008). Affordance analysis (online)
Week 4 Sept. 17 **Online**	Affordances ***Peer critique on blogs due*** ***Contribution to LT analysis integrating weeks 2&3 readings***	• The Design of Everyday Things (textbook) • Hartson, H. (2003). Cognitive, physical, sensory, and … (online)
Week 5 Sept. 24 **F2F**	Affordances ***Informal class presentation on affordances of selected learning technology*** Discuss week 4 readings	• Chapters 1, 2, & 12 in Theoretical Foundations of Learning Environments (textbook)
Week 6 Oct. 1 **Online**	Learning, Cognition, & Technology ***Blog contribution due on week 5 readings*** ***Refine LT analysis***	• Chapters 4 & 6 in Theoretical Foundations of Learning Environments (textbook)
Week 7 **Oct. 9** **Tuesday** **F2F**	Learning, Cognition, & Technology ***Informal class presentation on affordances of selected LT*** Discuss week 6 readings in class	• Chapters 7 & 9 in Theoretical Foundations of Learning Environments (textbook)
Week 8 Oct. 15 **Online**	Learning, Cognition, & Technology ***Peer critique on blogs due*** ***Refine LT analysis***	• Chapter 10 in Theoretical Foundations of Learning Environments (textbook)
Week 9 Oct. 22 **F2F**	Learning, Cognition, & Technology ***Formal Presentation on LT Analysis***	• Chapters 1 & 2 in Designs for Learning Environments of the Future (textbook)
Week10 Oct. 29 **Online**	Designs for Learning Environments ***Blog contribution due on weeks 8&9 readings*** ***Feedback on LT analysis presentation***	• Chapters 3 & 4 in Designs for Learning Environments of the Future (textbook)
Week11 Nov. 5 **F2F**	Designs for Learning Environments Discuss week 10 readings in class ***Work on consolidating LT affordances*** ***Select TSLE***	• Chapters 5 & 6 in Designs for Learning Environments of the Future (textbook)

Week12 Nov. 12 **Online**	Designs for Learning Environments ***Peer critique on blogs due*** ***Finalize LT affordances (cognitive criteria)***	• Chapters 8 & 9 in Designs for Learning Environments of the Future (textbook)
Week13 Nov. 19 **F2F**	Designs for Learning Environments Discuss week 12 readings in class ***Work on TSLE analysis***	• Chapters 10 & 11 in Designs for Learning Environments of the Future (textbook)
Week 14 Nov. 26 **Online**	Designs for Learning Environments ***Work on TSLE analysis***	
Week15 Dec. 3 **F2F**	Designs for Learning Environments Discuss week 13 readings in class ***Work on TSLE analysis***	
Week16 Dec. 10	***Analysis of TSLE presentations*** ***Analysis Report due***	